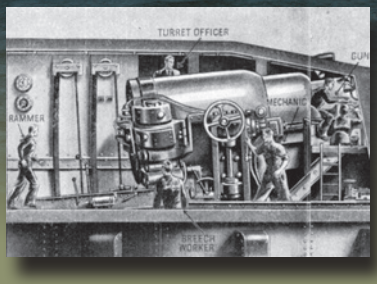
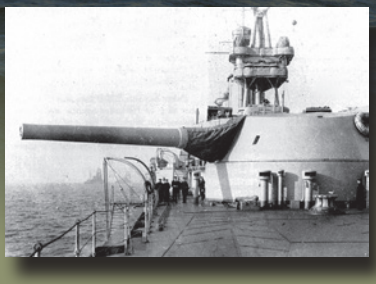
SUPER-BATTLESHIPS OF WORLD WAR I

The lost battleships of the Washington Treaty





ANGUS KONSTAM

ILLUSTRATED BY ADAM TOOBY

NEW VANGUARD 338

SUPER-BATTLESHIPS OF WORLD WAR I

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SUPER-BATTLESHIPS OF WORLD WAR I

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INTRODUCTION

During the naval arms race that preceded World War I, both Britain and Germany competed to build a larger fleet of dreadnought battleships than their rival. The popular slogan at the time was, 'Build first and build fast, each one better than the last.' This summed up the British Admiralty's policy. Starting with the original HMS *Dreadnought*, completed in 1906, each succeeding class represented an improvement on its predecessor, from better guns and armour to improved seakeeping qualities, propulsion and gunnery fire control. For example, the original 'dreadnoughts' mounted 12in guns, but by 1912 the first 'super-dreadnoughts' were commissioned, carrying far more powerful 13.5in guns. By 1915, the fast battleships of the Queen Elizabeth class began to enter service armed with 15in guns. At the time, this made them the most powerful dreadnoughts afloat. It was inevitable then, that this policy would continue, with subsequent dreadnought battleships and battlecruisers outclassing those that came before them. Of course, it wasn't just the British who were building increasingly powerful dreadnoughts. At the same time, the United States and Imperial Japan were expanding their fleets too, with both nations favouring 'super-dreadnoughts' mounting 14in guns. During the final years of World War I, the British Admiralty was aware that it might own the largest dreadnought battlefleet in the world, but many of the battleships were markedly inferior to the latest ones being built by other maritime powers. So, plans were laid for the building of the 'hyper-dreadnought', which would be superior to even the Royal Navy's new 15in-gun 'fast battleships'. These British battlecruisers with 16in guns and battleships armed with 18in ones were planned, and would enter service in the early 1920s. Not to be outdone though, the US Navy did the same, with 16in-gun capital ships, the first of which was laid down before the end of the war. The Japanese also planned 16in-gun battlecruisers and battleships, the first of which would also be laid down before the war's end.

At the Battle of Jutland, fought in May 1916, the largest guns on either side were the 15in pieces mounted in the Queen Elizabeth and Royal Sovereign classes of fast battleship. HMS *Queen Elizabeth*, pictured here, proved highly influential, as elements of her design were copied by American and Japanese naval architects, when designing their own heavy-gunned capital ships or 'super-battleships'.

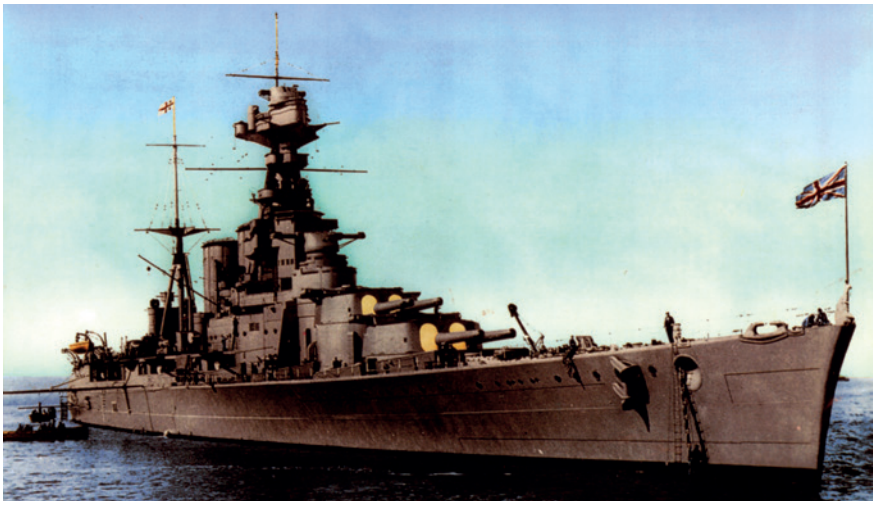
Inevitably though, it was the politicians who decided this had gone too far, rather than the admirals and naval architects. Embarking on a new and financially crippling naval arms race wasn't in anyone's interest, and so naval disarmament talks were begun to limit the size of existing fleets, and to restrict the building of new capital ships. In the end, most of these plans were abandoned in the wake of the Washington Naval Treaty of 1922. This new generation of 'super-battleships' was either scrapped or converted on the stocks, or was never laid down. This book examines these incredible ships, and ponders what might have been if they had ever been completed.

WORLD WAR I BATTLESHIP DEVELOPMENT

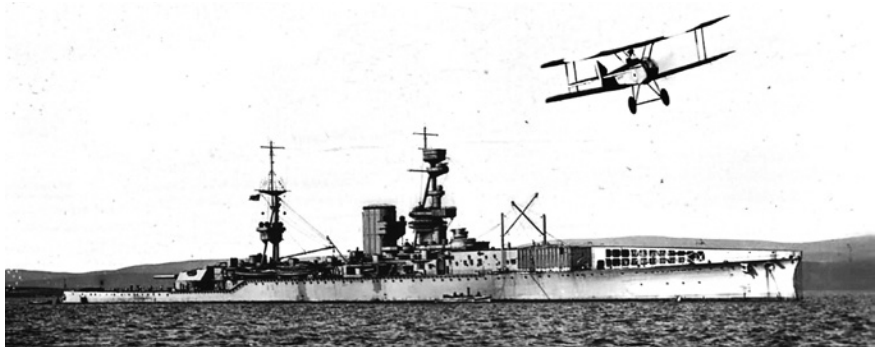
The Royal Navy

By building *Dreadnought*, the British Admiralty had levelled the playing field. Now with its existing battlefleet obsolete, the Admiralty had to outbuild its rivals, to maintain the Royal Navy's position as the world's largest fleet. This was important, as Britain's economy depended on maritime trade, and its global protection. As Imperial Germany challenged Britain to a naval arms race, the building of a dreadnought battlefleet became a priority, regardless of the expense. So, from 1906 on, nine more dreadnought battleships and four battlecruisers joined the fleet, all armed with the same 12in, 45-calibre Mark X guns mounted in *Dreadnought*, or a slightly improved version, the 12in, 50-calibre Mark XI gun. The last of these, the battlecruiser *Indefatigable*, was commissioned in April 1911, although she would be followed by two more, *Australia* and *New Zealand*, paid for by these two British dominions.

By 1908, dissatisfaction with the relative lack of penetrative power of the 12in gun led the Admiralty's Director of Naval Ordnance and Torpedoes (DNOT) to advocate mounting a more effective 13.5in gun. These had last been used in the Admiral, Trafalgar, Royal Sovereign and Hood classes of pre-dreadnought battleships, built between 1882 and 1894. In the late Victorian navy, these had been superseded by the 12in Mark VII gun, which was lighter, and proved superior, apart from in its weight of shell. The Director, Capt Moore, approached Vickers to develop a new version of the



The British battlecruiser HMS *Hood* was meant to be the lead ship of a class of four, but the others were cancelled before being launched. After *Hood* entered service in May 1920, the ship impressed the US Navy's General Board, and so influenced the design of America's own Lexington class of 'super-battlecruiser'.



The British light battlecruiser HMS *Furious* was designed to mount two 18in guns – the most powerful guns afloat – but by the time she was completed only her after single turret remained – the forward part of the ship being completed as an aircraft carrier. The mounting of this calibre of gun led to other navies contemplating the use of similar-sized ordnance.

13.5in gun. Their prototype was duly approved by the Admiralty in early 1909, and was designated the 13.5in 45-calibre Mark V gun. The striking velocity and penetrative power of its larger shells at long range gave it a considerable edge over the lighter gun. So that year, plans were drawn up for a 'super-dreadnought', built to carry the larger ordnance.

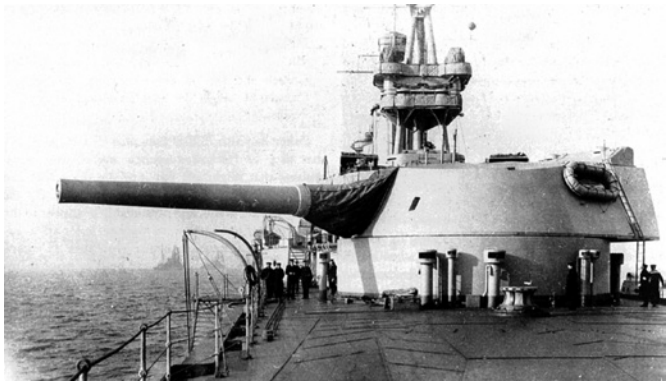
The first of these, *Orion*, was laid down in Portsmouth in November 1909. Three more of the class followed, and all four Orion-class super-dreadnoughts would be in service before the end of 1912. So too were the two Lion-class battlecruisers and the one-off *Queen Mary*, which were also built to carry the new gun. These super-dreadnoughts and their battlecruiser equivalents set the standard for further classes. Between 1911 and the start of World War I in August 1914, the four Orions were joined by four King George V-class and two Iron Duke-class super-dreadnoughts, with two more Iron Dukes due to join the fleet before the end of the year. The King George V class ships differed from the Orions by having their foremast and spotting platform repositioned ahead of the fore funnel, to reduce interference from smoke on spotting and rangefinding. They also had slightly longer hulls.

When World War I began, these 13 super-dreadnoughts and their battlecruiser counterparts made Britain's Grand Fleet an extremely formidable force. It was certainly more than a match in terms of numbers and firepower for its German opponent, the High Seas Fleet. However, as early as the winter of 1911/12, there were concerns that the Royal Navy would soon be outgunned by rival naval powers. Reports that Germany was developing both a 35cm (13.78in) and a 38cm (14.96in) gun caused alarm in the Admiralty, and Capt Singer, the new DNOT, was ordered to investigate British alternatives. The Elswick Ordnance Company had already developed a 14in (35.6cm) 45-calibre gun, which was mounted in the Argentinian super-dreadnought *Almirante Latorre*, then fitting out in Armstrong's yard at Elswick in Newcastle upon Tyne. She was purchased by the Admiralty in September 1914 and was renamed *Erin*. After her completion, she joined the Grand Fleet the following autumn. Capt Singer, though, felt that another more powerful 15in design being developed by Elswick would be preferable.

Elswick promised to build a prototype by the spring of 1912, to allow it to be tested, which in turn encouraged the Admiralty Board to press the Director of Naval Construction (DNC) Sir Philip Watts for a design which could incorporate these larger, heavier guns. The Admiralty wanted a powerful dreadnought which was faster than the rest of the battlefleet. This would allow these ships to range ahead of the fleet, and support it by concentrating their fire on the head of the enemy's battlefleet, or its battlecruisers, as the situation

demanded. Inevitably, this new warship was described as a 'fast battleship'. Watts and his successor Eustace d'Eyncourt completed the fast battleship design in the summer of 1912, and it was duly approved by the Admiralty.

Critically, the two DNCs pointed out that a coal-fired ship of the size required couldn't attain the speed needed to fulfil its role. So, they opted for oil-fired boilers – an innovation which became standard in all future British capital ships. Concerns about the need to import oil from the Middle East rather than rely on home-produced coal were overcome by the British government's purchase of majority shares in Persian oil companies. Treasury funding had already been set aside for the building of three dreadnoughts and a battlecruiser. These were used to fund the building of four fast battleships, the first two of which were laid down in Portsmouth and Devonport (Plymouth) in October 1912. Work began on the remaining two on Clydeside early the following year, while a fifth battleship, funded by the Federated Malay States, was laid down in Tyneside in October 1913.



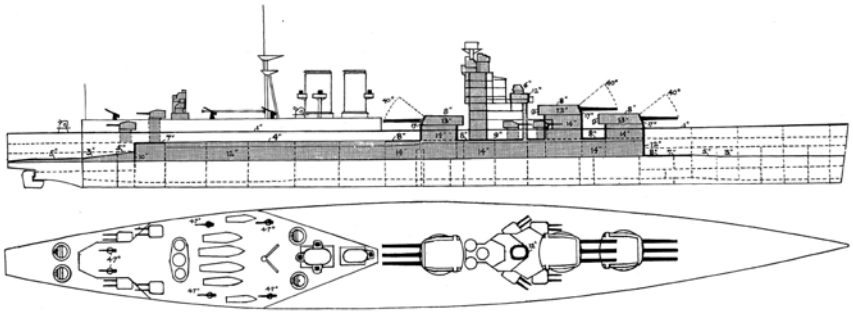
The 18in gun planned for the British N3 class of 'super-battleship' wasn't the first of its kind for the Royal Navy. This shows the after turret of the battlecruiser HMS *Furious*, completed in 1917, which mounted a single 18in (45.7cm) 40-calibre Mark I gun, the largest gun mounted on a warship until the completion of the Japanese battleship *Yamato* in 1941.

The first ship of the class, *Queen Elizabeth*, was launched in Portsmouth in October 1913. By the time war broke out in August 1914, only *Queen Elizabeth* and *Warspite* had been launched. However, these ships, together with the third, *Barham*, would join the fleet during 1915. The remaining two, *Valiant* and *Malaya*, the latter named to honour her funders, would join them in February 1916. Together, they made up the 5th Battle Squadron of the Grand Fleet, and four of these fast battleships played a prominent part in the Battle of Jutland (1916). These ships were slightly better protected than the other ships of the battlefleet, and slightly larger, but what set them apart were their guns and their engines. They weren't as fast as the Admiralty wanted, due to their displacement, but they still made over 23 knots, a couple of knots faster than the dreadnoughts.

Their 15in guns though, were a real success, and they proved themselves at Jutland. The 15in 42-calibre Mark I gun could fire a shell weighing almost a ton with considerable accuracy, out to a range of ten nautical miles or more. Just as importantly, even at that range the strike velocity and armour penetration ability ensured they could punch through an enemy protective belt 12in thick. It was little wonder that these superb guns, with some modifications, remained in use until 1960. The subsequent five-ship Royal Sovereign class mounted the same guns, although these ships were generally inferior and more cramped than the previous class. The 15in gun was also used in a series of battlecruisers, the two of the Renown class, the single-ship Hood class, and the two light battlecruisers of the Courageous class.

The British super-dreadnought HMS *Iron Duke*, namesake of her class, and the fleet flagship of the Grand Fleet at the Battle of Jutland (1916). The layout of her ten 13.5in guns was mirrored in later Japanese super-dreadnought designs, as well as British ones.

D'Eyncourt's innovative plans for the British G3 class of super-battlecruiser were greatly influenced by wartime lessons and embraced the American 'all-or-nothing' approach to protection to create something more akin to an up-gunned fast battleship than a true battlecruiser.



When the Courageous class and their near-sister *Furious* were first designed, the First Sea Lord, Admiral Fisher, got around a government moratorium of 1915 preventing the building of more capital ships by describing them as 'large light cruisers'. These were designed for use in his nascent plans for operations off Germany's Baltic coast, and were distinguished by their shallow draught, light armour and an impressive turn of speed. While *Courageous* and her sister ship *Glorious* mounted 15in guns, in two twin turrets, *Furious* was to be armed with two single 18in, 40-calibre Mark I guns, each mounted in its own turret. These were adapted twin 15in turrets, so that if problems were encountered with this new gun, then they could easily be replaced by twin 15in guns instead.

The two Courageous-class light battlecruisers joined the Grand Fleet in 1917, but in the 1920s, rather than being scrapped under the terms of the Washington Treaty, they were both converted into aircraft carriers. *Furious* though, had her forward turret removed while being fitted out, and while she had joined the fleet in the summer of 1917, by the end of the year she had returned to the dockyard, to be rebuilt as a fully fledged aircraft carrier. Her single 18in gun was never fired in anger. It remains the largest modern naval gun ever mounted in a British battleship.

The battlecruiser *Hood* was a more successful design, although when first designed in 1915, the Admiralty couldn't decide if the ship would be a fast battleship or a battlecruiser. Although the battlecruiser option was chosen,

A

HMS *INVINCIBLE*, A BRITISH G3-CLASS BATTLECRUISER, *C.*1928

After World War I, and drawing on the lessons of Jutland, British naval architects drew up plans for a capital ship which matched the speed of their latest battlecruiser HMS *Hood*, but which was both better armoured and better armed. The design included new innovations: sloping armour, triple turrets mounting newly designed 16in guns and internal bulges to thwart torpedoes. Essentially, this design was an improved version of the 'fast battleship' rather than a battlecruiser. The 'G3' class of four battlecruisers were to be laid down in late 1921, but progress was then suspended pending the results of the Washington Conference. In the end, the project was cancelled, and these magnificent ships were never built. This view of HMS *Invincible* (Fig. 1) is based on the plans issued to a Clydebank shipyard in October 1921, on the eve of the conference. Some details, though, had still to be worked out, such as the provision of aircraft, operating from turret-top flying-off platforms.

However, the abandonment of the project didn't mean the scrapping of these plans. Many of their features were incorporated into the design for the two-ship Nelson class of battleship, built to conform to treaty limitations. One of these was HMS *Rodney* (Fig. 2) completed in 1927, which mounted the same gun turrets as the G3s would have carried. *Rodney* is pictured here as she looked towards the end of her career, in 1944. For comparative purposes though, her late-war camouflage scheme has been removed, to better match the depiction of HMS *Invincible* above.

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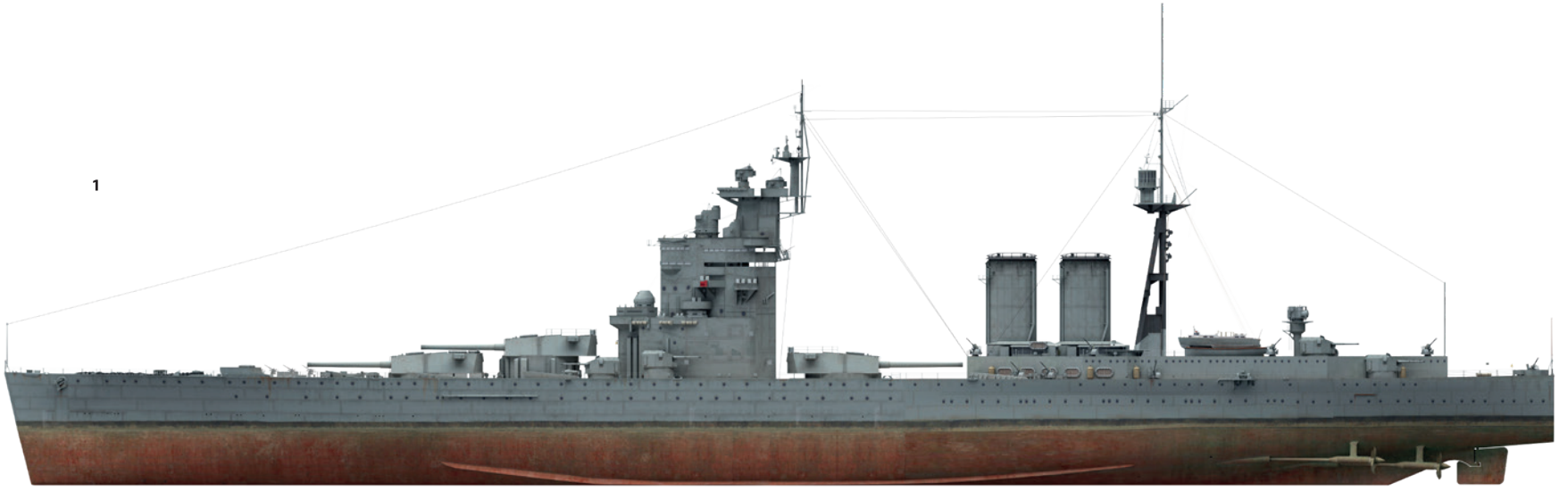

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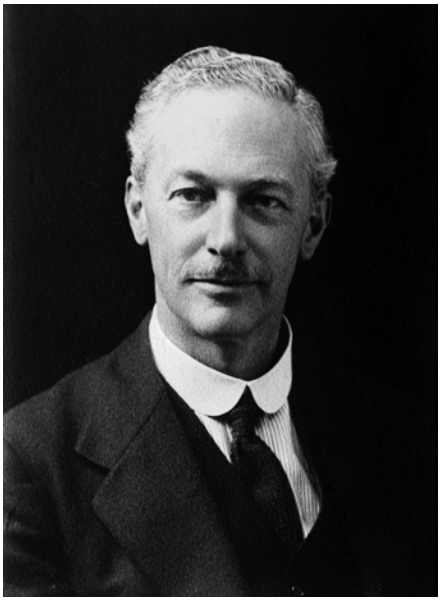
An impression of the final appearance of the British G3 class of 'super-battlecruiser', also known as the '1921 battlecruiser', drawn by naval historian and artist Oscar Parkes. It emphasizes the tower bridge, which provided a better platform for both command and fire control, and the forward concentration of the main armament. Both features were later used in the Nelson class.

after Jutland her design was modified to accommodate a thicker armoured belt. As well as *Hood*, three more Hood-class battlecruisers were laid down in 1916–17, but after the Jutland losses work on these was halted. These three ships (*Anson*, *Howe* and *Rodney*) were eventually cancelled in 1918, and only a re-armoured *Hood* was completed, entering service in May 1920. The DNC decided that following the lessons learned from Jutland, it made more sense to scrap the three others, and to devote the Admiralty's efforts into building capital ships which drew on the fleet's hard-won wartime experience.

By 1918, it was clear that despite the size of Britain's dreadnought battlefleet, the balance of naval power was shifting. The US Navy's battlefleet was expanding rapidly and contained a new breed of 'super-dreadnoughts' armed with 14in guns – the equivalent of or better than Britain's 13.5in ordnance. Word then reached the Admiralty that the Americans had been developing 16in guns, which were superior to the Royal Navy's new 15in weapons. Also, the Japanese were also rumoured to be planning an expansion of their own fleet, to include capital ships armed with 16in guns. So, to stay in the game the Royal Navy needed to match these developments, or even surpass them. If not, the Royal Navy would be overtaken by the US Navy by the early 1920s. So, in early 1919, the Admiralty ordered the DNC Eustace d'Eyncourt to draw up plans for two new types of capital ships, a battleship and a battlecruiser. At the same time, plans were laid to upgrade the navy's existing fleet of 15in-gun battleships.



Eustace Tennyson d'Eyncourt (1868–1951) became the Admiralty's Director of Naval Construction (DNC) in 1912, and was responsible for the design of the Royal Navy's Royal Sovereign, Hood and Renown classes. He then developed the 'super-battleship' plans for the G3 and N3 classes, and after their cancellation he modified them to produce the battleships of the Nelson class.

D'Eyncourt was helped by post-war access to German designs, especially the two-ship Baden class of fast battleship. These altered the DNC's thinking on armour protection, which led to the modification of his designs. Armament too was reconsidered, as the Admiralty favoured upgrading its ordnance to a 16in design, on the advice of Capt Crooke, the Director of Naval Ordnance (DNO). This was a joint ordnance project, involving Elswick, Vickers and others, but due to rushed testing the weapon was adopted without thorough evaluation. In the end, the 16in, 45-calibre Mark I gun was only marginally better than the 15in gun already in service, and it proved less mechanically reliable. Still, it was incorporated into the DNC's designs, and these were duly approved in August 1921.

The first design, designated 'G3', was an improved version of the existing fast battleships of the fleet, although it was designated as a battlecruiser due to its high speed and lack of firepower, compared to the second design, 'N3', which was in effect a 'super-battleship', an upgrade on the existing super-dreadnoughts in the fleet. The G3 battlecruiser would displace over 48,000 tons, some 20,000 tons more than

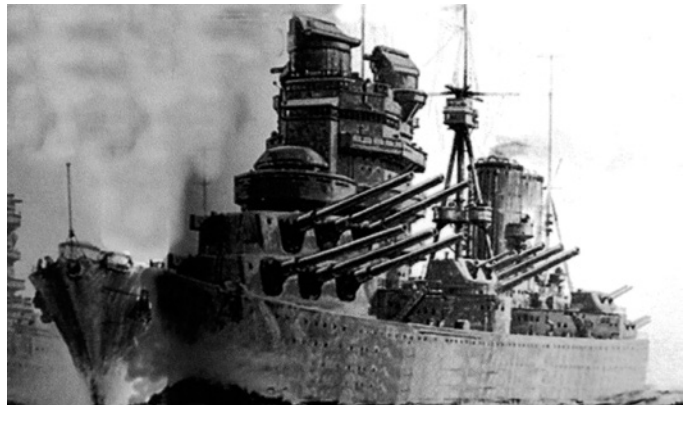
the fleet's 15in-gun fast battleships. It would be protected by an armoured belt up to 14in thick, proof against 18in shells at ranges over eight miles. The steam turbine propulsion system would give these ships a speed in excess of 30 knots, while their armament – nine 16in Mark I guns in three triple turrets – would make them the most powerful capital ships in the fleet.

This however was only part of the DNC's proposal. During 1920, plans were developed for a class of four N3 super-battleships, which resembled the G3 battlecruisers, but carried a thicker armoured belt. This reduced their speed markedly, to around 23 knots, but to compensate, their three triple turrets would mount a new design of 18in, 45-calibre Mark II gun. Several gun sizes had been considered, but the Admiralty opted for the largest gun possible. All this would cost money though, and in the aftermath of the war, the British treasury was all but empty. The national debt alone, following the war, was a third higher than the country's GDP. It was estimated that it would cost £9 million for each of these N3 battleships, the equivalent of three older Royal Sovereign-class ones. The total came to around £375 million for the eight new ships.

A view of the interior of a British 16in Mark I triple gun turret. The operation of the gun turret was a complex business, especially after extensive safety measures were introduced after Jutland. Still, the 16in Mark I guns of the G3 class of 'super-battlecruiser' could penetrate 8.8in of armour at a range of 15 miles. At 7½ miles, this increased to an impressive 14.4in.

In late 1920, the plans for the G3 battlecruisers were further advanced than those for the N3 battleships. They even had names allocated to them: either *St Andrew*, *St David*, *St George* and *St Patrick*, after the patron saints of Scotland, Wales, England and Ireland respectively, or else *Indefatigable*, *Indomitable*, *Inflexible* and *Invincible*, once the obsolete battlecruisers *Indomitable* and *Inflexible* were decommissioned. *Indefatigable* and *Invincible* had both been lost at Jutland. Although funding these would be tricky, by 26 October 1921 the Admiralty had ordered the construction of the four G3 battlecruisers from four British shipyards.

This process, though, was quickly overtaken by events. That October, naval disarmament talks were proposed in Washington. This gave both the Prime Minister and the British treasury the excuse they needed, and the Admiralty was ordered to suspend the ordering process for both the G3s and the N3s until these talks had run their course. So, the building orders were duly suspended by order of the British government on 18 November 1921. In the end, Britain's signing of the Washington Treaty in February 1922 led to the cancellation of both projects. Even if this hadn't happened, Britain's gloomy financial situation made it unlikely that these ships would have been built, regardless of the international situation. These ships, though, remain the most powerful capital ships the Royal Navy never had.



A reconstruction of the British N3 class of 'super-battleship', drawn by marine artist Geoff Hunt. The design of the '1922 battleship' was still incomplete when the project was shelved in the aftermath of the Washington Treaty, so their final appearance might have been different. These would have been the most powerfully armed British battleships ever built.

The Imperial Japanese Navy

Before the Russo-Japanese War of 1904–05, the Japanese had bought their battleships from British yards. The war, though, encouraged the Japanese to be more self-reliant, and so their first semi-dreadnoughts of the Satsuma class were built in the Japanese naval shipyards of Kure and Yokosuka. A lack of suitable guns led to them having a mixed armament of 12in (30.5cm) and 10in (25.4cm) main guns. Not being all big-gun battleships, they weren't proper 'dreadnoughts'. While they were fitting out, two more battleships were laid down, of the Settsu class. These would be true dreadnoughts, mounting a main armament of 12in (30.5cm) guns. They both entered service in 1912, becoming Japan's first dreadnought battleships. This, and the victory over Russia, allowed Japan to enter the ranks of the world's major maritime powers.

However, Japan had no plans to build a large dreadnought battlefleet. Instead, in 1910 the Japanese naval strategist Admiral Satō Tetsutarō developed the principle of the *Hatchihatchi Kantai* ('Eight-Eight' fleet). This called for a squadron of eight modern dreadnoughts supported by eight powerful armoured cruisers. Tetsutarō, nicknamed the 'Mahan of the East', argued that as Japan's most likely rival was the United States, the Japanese battlefleet should be 70% of the strength of the US Navy's own battlefleet. The idea was that in a time of war, the US Navy – split between the Atlantic and the Pacific – would be hard-pressed to win a Pacific campaign against a slightly stronger Japanese fleet.

Japan's Naval Ministry duly adopted the 'Eight-Eight' plan, but modified it slightly, replacing its armoured cruisers with battlecruisers. The Japanese already had some small pre-dreadnought battlecruisers, but in 1910 the Ministry turned to the British firm of Vickers to design a more modern class

B

THE BRITISH ATLANTIC FLEET ON EXERCISE, *C*.1930

If the British Admiralty had been allowed to complete its post-war shipbuilding plans, then its new G3 battlecruisers and N3 battleships would have formed the core of the Royal Navy's battlefleet for decades to come. It was inevitable that the older dreadnoughts would have been scrapped, but that would still have left a powerful post-war fleet of ten battleships and three battlecruisers armed with 15in guns, supported by a handful of aircraft carriers. By then, the Grand Fleet would have been rebranded the Atlantic Fleet, which would have shared the navy's pool of these capital ships with the Mediterranean Fleet. This illustration envisages if the new British battleships and battlecruisers had entered service on schedule, and some had also joined the Atlantic Fleet. In the foreground, the 2nd Battle Squadron of the Atlantic Fleet is led by HMS *St George*, flying the command flag of the fleet's commander-in-chief, Admiral Sir Ernle Chatfield. Following in echelon astern of the flagship is her newly commissioned sister ship HMS *St Andrew*, followed by *St David*. Also in the battlefleet at the time were the Queen Elizabeth-class battleships HMS *Warspite*, HMS *Barham* and HMS *Malaya*, all of which had undergone modifications, including the trunking of their two funnels into one. Attached to these two battleship squadrons was the fleet's Battlecruiser Squadron, made up of the G3-class vessels HMS *Invincible*, HMS *Inflexible* and HMS *Indomitable*. *Invincible* would have flown the command flag of the fleet's second-in-command, Vice Admiral Sir Dudley Pound.

The First Sea Lord, Admiral Beatty, requested funding for both groups of warships, with four G3 battlecruisers to be ordered in 1921, and four N3-class battleships to follow them in 1922. It was left to the British government to find the money to fund them. This, though, proved an insurmountable hurdle. It was also politically sensitive, as the post-war mood was one of grief for the huge cost of the war on human life, and a general rejection of militarism in any form. The treasury advocated an immediate slashing of the naval budget, and the dramatic reduction of the battlefleet. Still, in 1921 the Prime Minister, Lloyd George, agreed to set aside £15 million for the laying down of the four G3 battlecruisers. If the international situation had demanded it, funds for their completion would somehow have been found. No fiscal approval was given for the N3 battleships, and so for the moment their building remained an Admiralty aspiration.

The Japanese super-dreadnought *Nagato*, namesake of her two-ship class, was the first capital ship designed entirely in Japan, her plans being drawn up by Yuzuru Hiraga. *Nagato*, which entered service in November 1920, was the first battleship in the world to mount 16in guns.

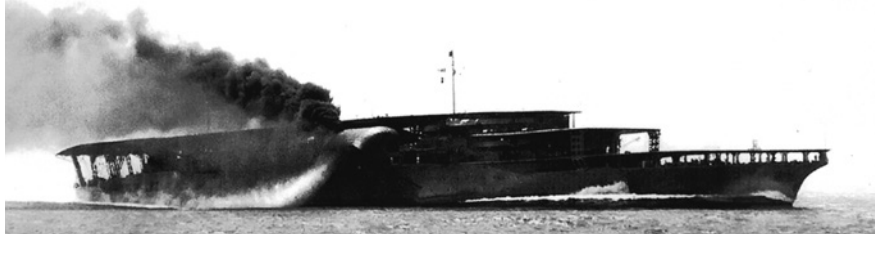
of these warships. If possible, though, these ships would be built in Japanese shipyards. This though, was problematic. First, due to economic woes, the Japanese government lacked the funds the navy wanted. Another problem was that Japanese industry was unable to supply all the steel, propulsion systems and ordnance needed to build these ships at home. So, Japanese industrial independence became a key part of the naval expansion programme. A useful first step was the licence granted to Mitsubishi and Kawasaki to build American and British steam turbines.

This was part of a larger scheme to involve foreign companies, to give Japan access to the latest technology. Then, even if it meant relying heavily on foreign assistance, the Japanese would build the warships in their own yards, and so give Japanese companies the chance to embrace the latest shipbuilding techniques, as well as modern technology. Economic constraints, though, meant the 'Eight-Eight' plan was pared back to include just one new battleship and four new battlecruisers. Inevitably, the Japanese looked to Britain for help in designing and building these ships.

For the design, the Japanese turned to Thomas George Owens, who, after changing his name in 1915, became Sir George Thurston. This gifted British naval architect was the chief designer for Vickers Ltd, based at Barrow-in-Furness. At Vickers, Owens had designed super-dreadnoughts for the Ottoman Navy, mounting 14in guns. These, then, became the basis of the design for Japan's new Fuso-class super-dreadnought, which was laid down in Kure in March 1912. The following year, the Japanese parliament approved the *Yamashiro*, a second ship of the class, which was laid down in Yokusaka in late 1913. These 'super-dreadnoughts' finally entered service in 1915–17, becoming the first truly modern battleships in the Imperial Navy.

Meanwhile, Owens' design for the new Japanese battlecruiser was approved by the Japanese Naval Ministry in late 1910, and the first, *Kongō*, was laid down in Barrow-in-Furness in January 1911. Once again, the Japanese had opted for the powerful Vickers 14in (35.6cm) gun, which was duly built under licence in Japan, with British guidance. After *Fuso*, the *Hiei*, *Haruna* and *Kirishima* would be built in Japan. So, in November 1913, when *Kongō* arrived in Yokosuka, *Hiei* was fitting out there, while *Haruna* and *Kirishima* were about to be launched in the Kawasaki yard at Kobe and the Mitsubishi yard at Nagasaki.

Meanwhile, 14in guns were being constructed in the Kure naval arsenal, and in the Japan Steel Works armament factory at Muroran on



The Japanese aircraft carrier *Akagi*, pictured shortly after entering service in early 1927. The former Akagi-class super-battleship mounted the planned secondary battery but not the main 16in one. Instead, her main offensive power would now lie in her aircraft. Her flight deck was staggered, with two small flying-off decks at the bow at the same level as her hangar deck, while the upper flight deck was primarily used for landing-on. In the late 1930s, *Akagi* was given a more conventional single flight deck.

Hokkaido, in northern Japan. This meant that all of these shipyards and armament factories now had what the Naval Ministry wanted – access to the latest technology. All four of the battlecruisers would be in service before the end of the year and would play their part in the naval campaign against Imperial Germany. *Fuso* and *Yamashiro* would join the fleet in 1915 and 1917 respectively. For the Japanese, though, this was only the start of their 'Eight-Eight' fleet. The two Ise-class dreadnoughts (*Ise* and *Hyuga*) were modified versions of the Fusos, which duly entered service in the final months of the war. By then, the Japanese were also designing their own version of the British Queen Elizabeth-class fast battleships.

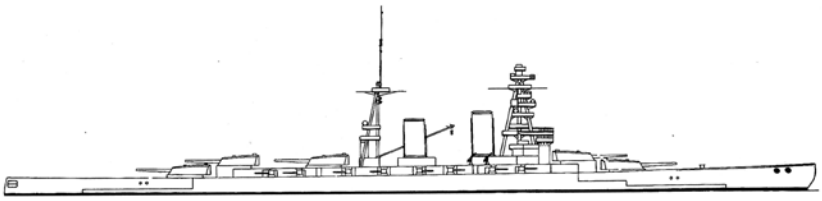
The Japanese Emperor Hirohito (reigned 1926–89), reviewing the Combined Fleet anchored in Tokyo Bay in 1924, from the deck of a light cruiser. They are approaching the battlecruiser *Kongō*. By then, a third of Japan's national budget was spent on the Imperial Navy.

These were designed by Capt Yuzuru Hiraga of the Japanese Navy's naval construction department, and his plan, designated Design A-102, was his own, although it incorporated elements of designs submitted by Vickers. These fast battleships would be powered by Japanese-built turbines and mixed boilers, which could operate using fuel oil or coal. This gave them a maximum speed of 26½ knots. Although they were protected by a similar 12in belt armour to the Fusos, they mounted a far more powerful 16in main battery. The eight guns were mounted in four twin superfiring turrets, two forward and two aft. As a result, when *Nagato* was commissioned in November 1920, she was – for a few months – the most heavily armed battleship in the world, and the fastest.

Nagato and *Musu* were still fitting out when Hiraga, now an Admiral, proposed an improved version, the Design A-127 design. This was an enlarged *Nagato*, with an extra turret forward of the two after ones, and a slightly thinner but more efficient sloping belt armour. These ships would become the fast battleships of the Kaga class. Their design was significant. Hiraga's sloping armour was the result of a study of reports on the effectiveness of gunnery at the Battle of Jutland (1916). As a result, Yuzuru's armoured belt was designed to be proof against 16in shells, at ranges of up to ten miles. The older system of a lower armoured deck was abandoned too, in favour of thicker deck armour and a thinner splinter deck below it.

During the interwar period, Japan's leading naval architect was Rear Admiral Yuzuru Hiraga (1878–1943). After studying warship design in Britain, he became the Imperial Navy's Chief Engineering Director, responsible for creating Japan's 'Eight-Eight' battlefleet. It was Hiraga who designed the Nagato, Kaga, Kii, Amagi and No. 13 classes of 'super-battleships' and 'super-battlecruisers'.

The two Kagas (*Kaga* and *Tosa*) were laid down in 1920, in Kawasaki's yard in Kobe and Mitsubishi's yard in Nagasaki. They were launched in late 1921, but work was halted during their fitting out, due to the disarmament talks going on at the Washington Naval Conference. Meanwhile, in 1919, Yuzuru Hiraga developed plans for a new battlecruiser. His design B-64 was based on the Kaga-class fast battleship, which in turn was a modification of the Nagato class. These, though, would be larger and less well-armed. Instead, they would be fast, with mixed boilers, capable of making up to 30 knots. Hiraga had



Rear Admiral Hiraga's 'super-battlecruiser' design B-64, produced in 1919, was essentially an enlarged version of the Kaga-class battleship, with two funnels rather than one, slightly thinner armour and a higher speed. All four of these Amagi-class battlecruisers were cancelled before their launch, and only *Akagi* survived, after being completed as an aircraft carrier.

considered turbo-electric propulsion, as he had with the Kaga class, but in both cases he abandoned the idea.

More significantly, these new Amagi-class battlecruisers (a four-ship class, to be named *Amagi*, *Akagi*, *Atago* and *Takao*) would carry ten 16in guns, in five twin turrets. These would be in a very similar configuration to Yuzuru's Kaga-class fast battleships but mounted on a longer hull. The first two ships of the class were laid down in the naval yards at Kure and Yokosuka in late 1920, while the other two would follow a year later, in December 1921, in the Kawasaki and Mitsubishi yards. All work on them ceased the following February, though, when Japan signed the Washington Treaty. If built, these four graceful and powerful ships would have been a real boost to Japanese naval power in the Pacific. With their 10in sloping belt armour they were well-protected, but like classic battlecruisers their real emphasis was on speed and firepower. It was interesting too, that the Japanese were beginning to blur the distinction between the fast battleship and the battlecruiser. It was a largely inevitable step, which would become even more noticeable in Hiraga Yuzuru's next project.

This would be a development of the Amagis, with thicker armour and longer hulls. If built, the Kii class of four 'high-speed battleships' would be 60ft longer than the Kagas, and would carry a similar armament of ten 16in guns. These would be protected by a slightly thicker sloped belt, and a more effective array of turbines and boilers, capable of operating using oil or coal. More importantly, despite the extra armour, these battleships would be capable of making almost 30 knots. Like the Amagis, they were ordered in pairs. Orders for *Kii* and *Owari* were placed in the Kure and Yokosuka naval yards in October 1921, but they hadn't been laid down when the orders were cancelled the following February, as a result of the treaty. At the same time, the second two battleships (No. 11 and No. 12), which at this stage hadn't

C

IJNS *AKAGI*, A JAPANESE AMAGI-CLASS BATTLECRUISER, C.1932

In 1911, the Japanese Navy commissioned the building of four British-designed battlecruisers. These mounted 14in guns, which made them the equivalent to the new generation of 13.5in gun-armed battlecruisers entering service with the Royal Navy. Japan's four Kongo-class battlecruisers proved highly successful, and encouraged the design of an improved version, designated B-64. The war ended before the plans for this new Amagi class was completed. Still, the Japanese pressed on, and once funding was approved, the first of these four ships was laid down in late 1920. These would mount the same 16in guns as the Kongos, in five twin turrets, supported by a secondary battery and anti-aircraft guns. These primarily oil-fuelled battlecruisers could make 30 knots. At the same time, their designer planned an even more impressive scaled-up version of the Amagis, mounting eight 18in guns in four twin turrets. However, both classes – the four Amagis and the four No. 13s – were cancelled after the signing of the Washington Treaty. One of the Amagis, though, IJNS *Akagi*, was spared the breaker's yard and was rebuilt as an aircraft carrier. Fig. 1 shows *Akagi* if completed as originally planned. Fig. 2 shows the appearance of *Akagi* when she entered service in 1927, with separate launching and landing flight decks. Eight years later, she would be rebuilt, with a single large flight deck.

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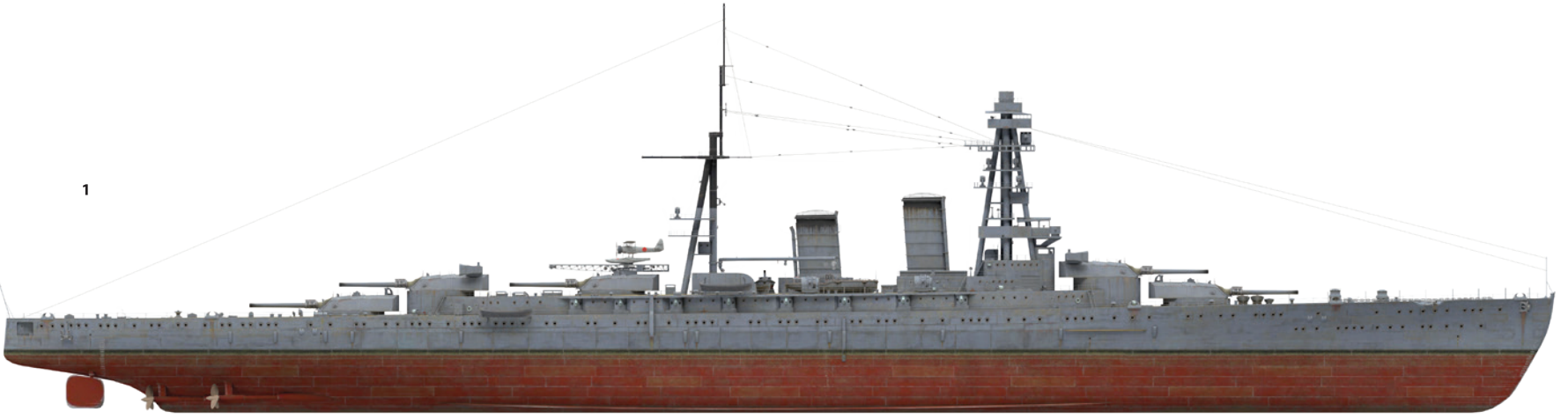

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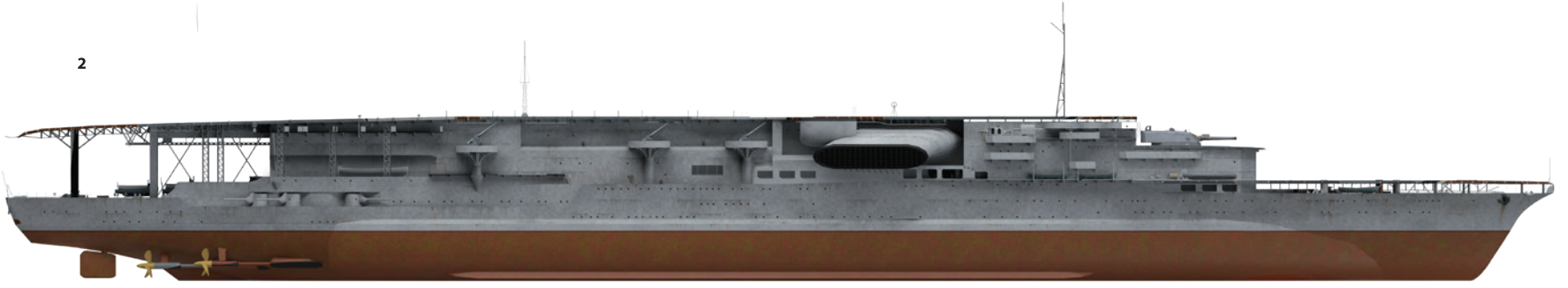
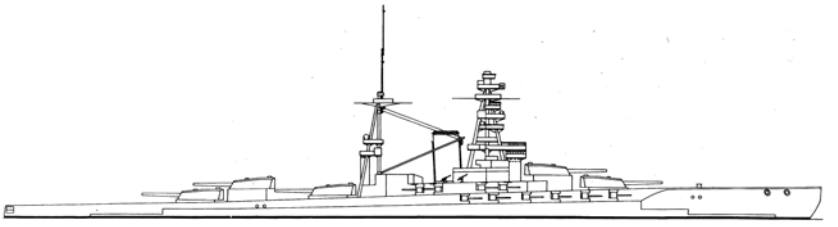




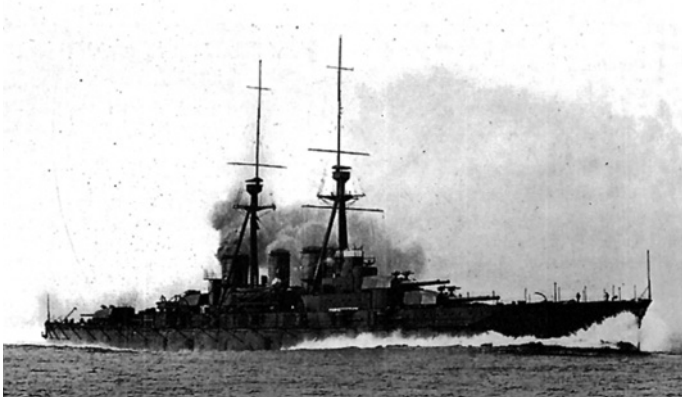
The 'super-battleship' A-127 design produced by Hiraga was an enlarged version of his earlier Nagato class. The two ships of the class, *Kaga* and *Tosa*, were launched in late 1921, but cancelled the following February. *Kaga* was subsequently completed as an aircraft carrier.

even been named, were also cancelled. So, none of these powerful 'high-speed battleships' were ever laid down.

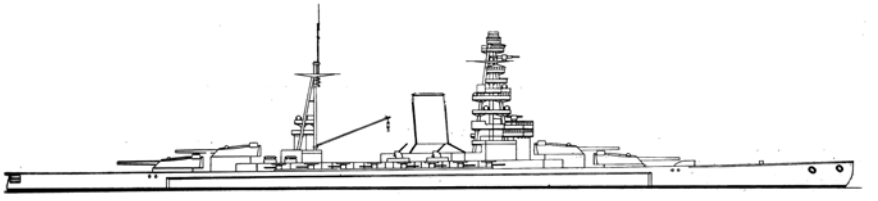
This though, wasn't quite the end of the Japanese shipbuilding enterprise of the era. In 1921, Hiraga Yuzuru's plans for a more powerful capital ship were viewed by the Naval Ministry. This was officially described as a fast battleship. Like the Amagis, this class of four ships would be capable of making 30 knots, but they were much better protected, with an 11in belt of sloping armour. These would be 70ft longer than the Amagis too, with 900ft-long hulls. This was needed to accommodate the real advance of these ships – the armament. This class of four ships, known only as capital ships No. 13 to No. 16, would mount eight 46cm (18.1in) 5th Year Type guns apiece, in four twin superfiring turrets, two forward and two aft. At the time, though, work on these guns was incomplete. Still, the ships were scheduled to be laid down in Kure, Yokosuka, Nagasaki and Kobe in the summer of 1922, with completion five years later. In the end, the treaty ended both the laying down of the ships, and the development of the guns to mount in them.

After the signing of the Washington Treaty in February 1923, all work on ships still under construction was halted. Most then sat on the slipways of the four shipyards until their fate was decided. Of the two Kaga-class fast battleships, both had been launched, and *Kaga* was eventually completed as an aircraft carrier. *Tosa*, though, remained tied up at Nagasaki until April 1924, when she was towed out into the Bungo Straits, and was sunk as a target after a series of extensive weapons tests against her armour system. Her sacrifice produced useful information, which would be used in the development of the Yamato-class battleships, which were effectively a culmination of the design work carried out a generation before by Yuzuru.

The sleek lines of the battlecruiser *Kongō*, namesake of her four-ship class. The British influence on these super-battlecruisers is clearly evident, and served as the basis for the two further classes of Japanese super-battlecruisers which were cancelled in the aftermath of the Washington Treaty. The Kongōs were extensively rebuilt during the interwar period, but all of them were lost during World War II.



As for the Amagi class, in 1923 *Amagi* was badly damaged in an earthquake, and the following year she was broken up on the stocks, as were *Atago* and *Takao*. *Akagi* though, was given a reprieve. In November 1923, after 21 months of abandonment on the slip in Kure Naval Yard, work was resumed. This time, like *Kaga*, *Akagi* would be rebuilt as an aircraft carrier. She was launched in 1925 and would enter service with the Imperial Navy five years later, in March 1927, a year after *Kaga* joined the fleet. So, of all the battleships and battlecruisers designed by Yuzuru, only the two Nagato-class battleships *Nagato* and *Mutsu* would ever see service. During World War II,



The final Hiraga design of super-battlecruiser was an enlarged version of the Amagi class but built around the 18.1in (46cm) 50-calibre 5th Year Type gun then being developed in Japan. Before being cancelled by the Washington Treaty, these ships were scheduled to be laid down in the summer of 1922, and were due to be completed five years later.

the carriers *Akagi* and *Kaga* would be the first to go, sunk at the Battle of Midway in June 1942. *Mutsu* would be lost in a magazine explosion in June 1943, while lying at anchor off Hiroshima, while *Nagato* would survive the war, only to be 'expended' in nuclear bomb tests in Bikini Atoll in July 1946.

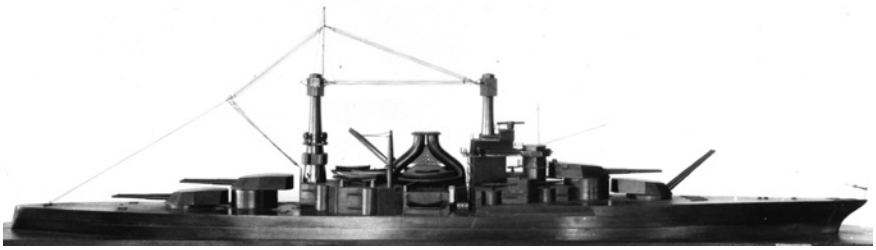
The United States Navy

The US Navy's modern coming of age was in 1898, when it emerged the victor in the Spanish-American War. The naval campaign was singularly one-sided, but the freshly created pre-dreadnought fleet performed well. In the decade that followed, the fleet was expanded considerably. The global cruise of its 'Great White Fleet' in 1907–09 served to display its strength to the world, and assure America's place among the world's leading naval powers. This demonstration of American naval power though, also highlighted that the US Navy still had much to do. At the time it lacked the cruisers and support ships required, and destroyers had to fill in as the fleet's eyes and ears. America lacked the overseas bases it needed to match the country's new global aspirations, and it still lacked the ability to operate simultaneously and effectively in both the Atlantic and the Pacific Oceans.

HMS *Dreadnought*, of course, rendered the Great White Fleet obsolete. Since the turn of the century, several influential naval officers advocated the adoption of an all-big-gun battleship design. As early as late 1903, the navy's Bureau of Construction and Repair (C&R) began half-heartedly developing various designs. However, it wasn't until President Theodore Roosevelt showed interest a year later that the project was taken seriously. In early 1905, Congress approved funding for two new battleships displacing 16,000 tons. As a result, the Constructor of the Navy, Rear Admiral Washington L. Capps, came up with a design which would fit this very limiting displacement, but would act as a testbed for an all-big-gun armament.

This would become the two-ship South Carolina class – America's first dreadnoughts. So, it could be argued that the dreadnought concept was first developed in the USA. However, when the first of these ships, *South Carolina*, was laid down in December 1906, *Dreadnought* was already half-built. The second ship, *Michigan*, was laid down 18 months after *Dreadnought* entered service. Both of these American dreadnoughts were finally completed in early 1910. They were small, underpowered and more lightly protected than *Dreadnought*, but Capps' design did incorporate some innovative features. The ships mounted eight 12in guns in four twin superfiring

The launch of the American Colorado-class dreadnought USS *Washington* (BB-047) in New York in September 1921. This powerful new super-dreadnought was never completed as work on her was cancelled the following February, after the signing of the Washington Treaty. In November 1924, *Washington* was sunk after being used as a gunnery target.



The official naval architect's model of the South Dakota class of super-battleship, created by the US Navy's Bureau of Construction and Repair (C&R) in 1920. The most distinctive feature of these ships was their two funnels (or smokestacks), trunked together, to keep the bridge and director positions clear of smoke. Later, this innovation was adopted by both the British and the Japanese.

turrets, arrayed fore and aft. This became a feature of all later American dreadnoughts. So too did the latticework cage-masts which became such a characteristic of American battleships from World War 1 on.

These were followed by the two ships of the Delaware class, *Delaware* and *North Dakota*, which were authorized by Congress in 1906. The Delawares mounted ten 12in guns, in an unusual layout with two turrets forward and three aft. These were faster and better protected than the South Carolinas and were fitted with turbines rather than reciprocating engines. This meant that *Delaware* fully matched the standard set by *Dreadnought*. These ships were not without their faults, the most serious being their poor seakeeping qualities, which made their forward turrets difficult to operate in anything other than calm seas. This, though, was in part due to their small displacement of just over 20,000 tons. Like the first two American dreadnoughts, both Delawares would enter service in early 1910.

From early 1910 until the United States' entry into World War I in April 1917, the United States set about building a dreadnought battlefleet of their own. As before, these were usually built in pairs. The Florida class completed in 1911 were essentially repeats of the Delawares, while the Wyoming class of the following year mounted six twin turrets. These all carried 12in guns, and the Americans were aware the British were building 'super-dreadnoughts', mounting more potent 13.5in guns. Plans for a 14in gun alternative were drawn up, but in the end the navy pressed ahead with the 12in guns for the Wyomings, to avoid extensive delays in their construction.

However, the next pair of dreadnoughts, *New York* and *Texas*, carried ten 14in, 45-calibre guns, in five twin turrets. Strangely, the General Board of the US Navy made the retrograde step of using reciprocating engines in the two dreadnoughts. The idea behind this was it gave the battleships trans-

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USS *INDIANA*, AN AMERICAN SOUTH DAKOTA-CLASS BATTLESHIP, *C*.1926

By the end of World War I, the US Navy possessed a powerful fleet of modern dreadnoughts and super-dreadnoughts, despite the continued parsimony of the US Congress. The most recent of these had adopted an all-or-nothing form of protection, where armour was concentrated around the ship's vitals. Most of these mounted 14in guns in twin turrets, but the Colorado class, laid down from late 1917, carried the more powerful 16in gun, albeit in twin turrets. In 1919, though, Congress approved the building of a greatly enlarged class of capital ship. The South Dakota class ships would be considerably larger than their predecessors and would mount 16in guns in triple turrets. The innovative use of turbo-electric drives for their propulsion also ensured these large battleships would be fast too. The first of these six powerful super-battleships were laid down in early 1920 (Fig. 1), but construction work was slow, and was eventually halted at the start of the Washington Conference. The following year, all six ships were cancelled. It would be another 15 years before the US Navy would build more battleships. These would mount the same powerful guns as the South Dakotas. Meanwhile, during the interwar years, the most powerful guns in the fleet were those of the Colorado class. One of these, USS *West Virginia*, is shown in Fig. 2.

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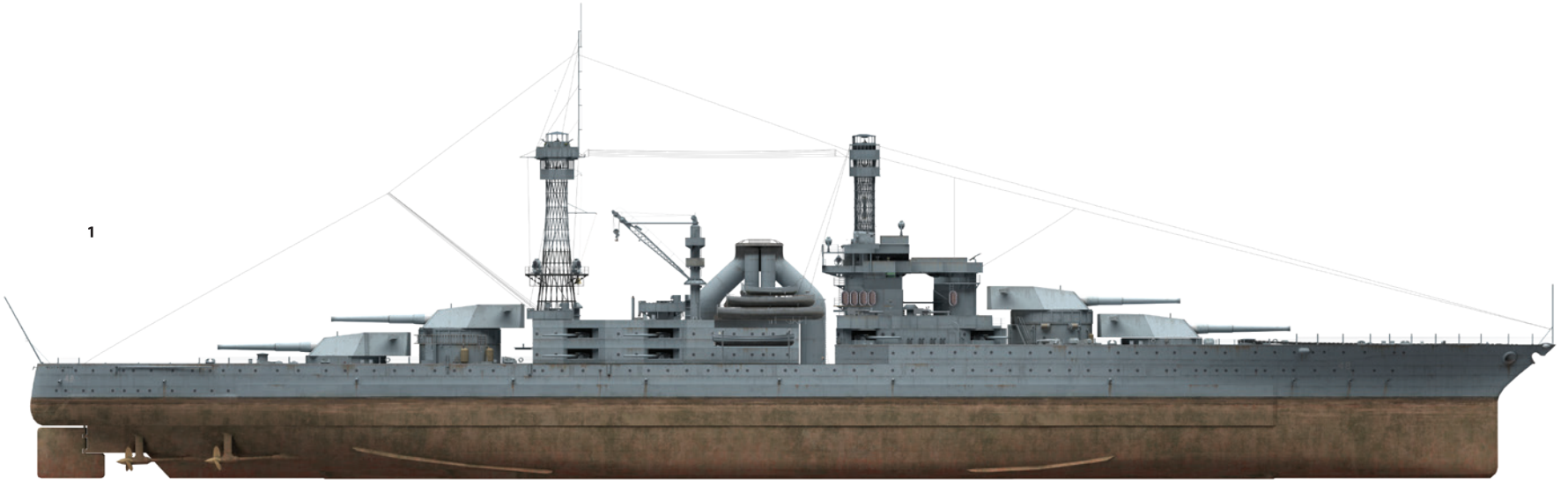

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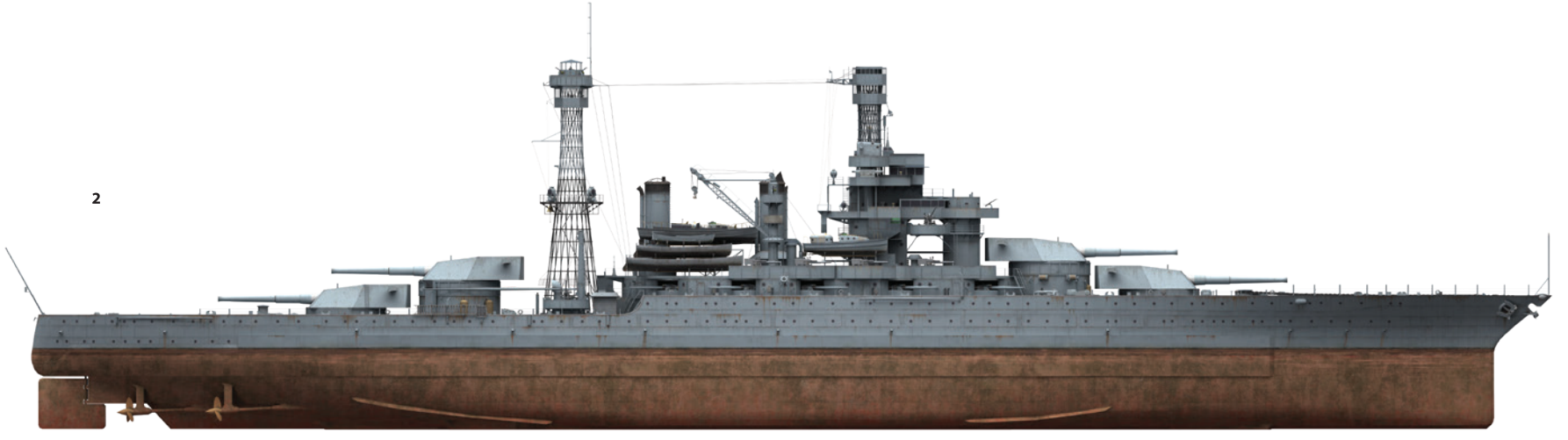
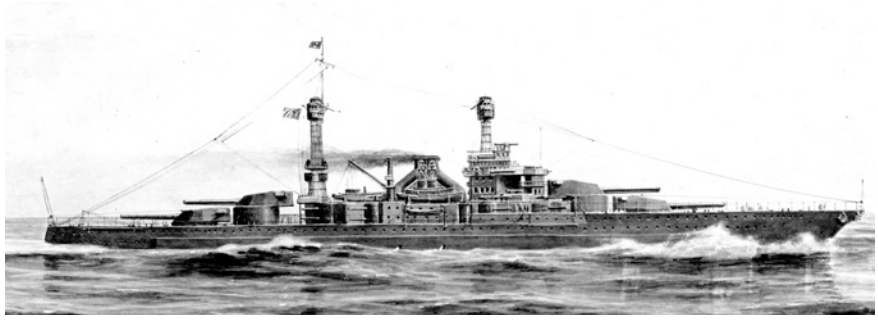




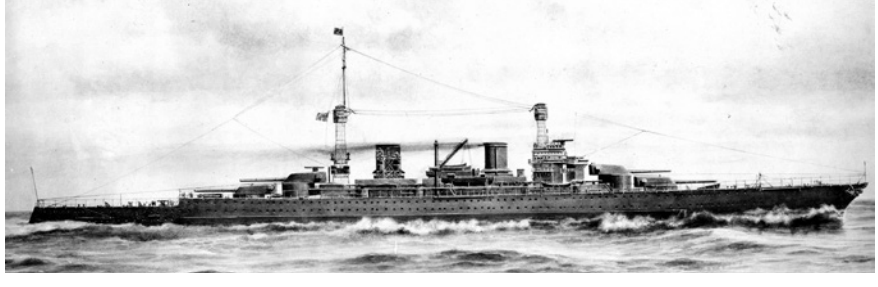
A depiction of a South Dakota-class super-battleship, drawn by 'F. Muller' *c.*1920, and based closely on the plans drawn up by the innovative naval architect David W. Taylor, head of the US Navy's C&R Bureau.

Pacific range, able to steam from California to the Philippines without taking on more coal. Incidentally, as well as being the first US 'super-dreadnoughts', the New Yorks would be the last American battleships to rely on coal.

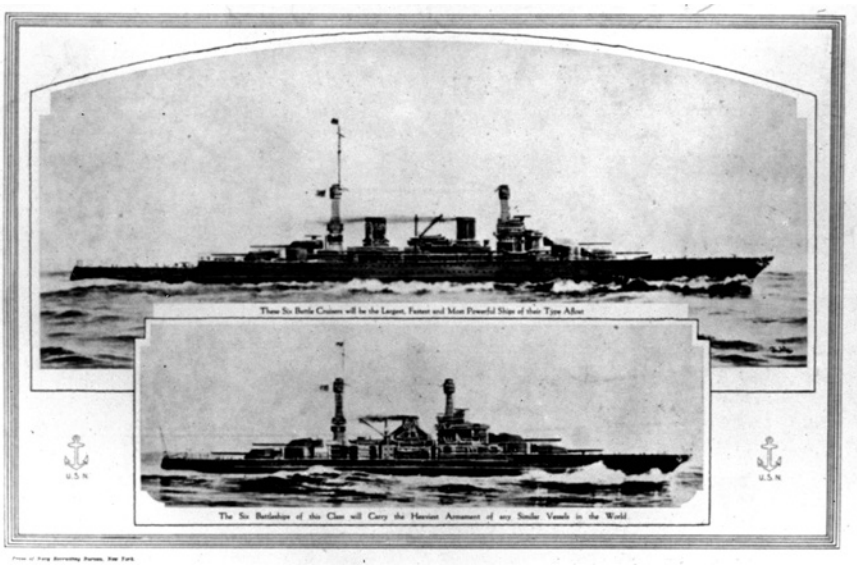
As gun calibres increased, so too did the penetrative ability of projectiles. The antidote was a thicker armoured belt, and so *New York* and *Texas* had a marginally thicker belt than their predecessors. It was generally thought though, that any future naval battle would be fought at ranges over 5 miles, when targeting specific portions of a ship such as the turrets or conning tower would be nigh-on impossible. So, American naval designers came up with the concept of all-or-nothing protection. Rather than attempt to protect the whole ship and have the armoured belt tapering off at the two ends, this protection would be thicker, but concentrated where it was needed most. This meant protecting the ship's vitals – her turrets and magazines, machinery spaces and conning tower. To compensate for this, practically no armour would be fitted elsewhere, in less vital areas of the hull.

This was also a period when Congress resented what it saw as excessive naval spending. Plans for larger capital ships had to be shelved, and instead the General Board and the C&R Bureau developed what would become a 'standard-type battleship', a super-dreadnought mounting eight 14in guns, in four twin turrets mounted on the centreline, two forward and two aft. The first of these would be the two ships of the Nevada class, *Nevada* and *Oklahoma*, laid down in late 1912, and commissioned in early 1916. The innovative feature of the Nevadas was their all-or-nothing protection. By using four rather than five turrets, there was also a more efficient use of the available armour.

The two Nevadas were followed by an enlarged class of two more Pennsylvania-class super-dreadnoughts, *Pennsylvania* and *Arizona*. They had better underwater protection than their predecessors, with effective torpedo bulkheads incorporated in their hull. They also saw a return to steam turbines. More dramatically, though, they carried triple turrets, a design which had



This drawing by naval artist F. Muller, produced in 1919, shows the final version of the US Navy's plans for the Lexington-class battlecruiser, as designed by David W. Taylor, and approved by the General Board of the US Navy.


These Six Battle Cruisers will be the Largest, Fastest and Most Powerful Ships of their Type Afloat
U.S.N.
U.S.N.
The Six Battleships of this Class will Carry the Heaviest Armament of any Similar Vessels in the World

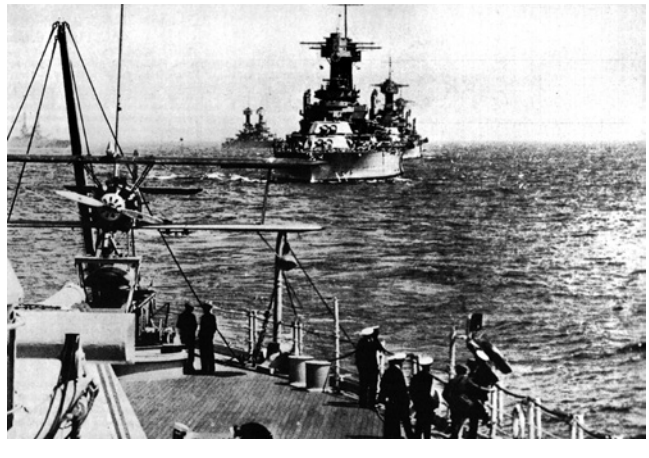
A 'What the Navy is Doing' poster produced by the US Navy's Recruiting Bureau in 1919. This one highlights the two new classes of capital ship about to be built, the Lexington class of battlecruisers (top) and the South Dakota class of battleships (bottom).

been under development for some time and which had been intended to be employed in the Nevada class. However, a lack of funds meant that their use had to be postponed. Their enhanced armament, though, made these more effective ships than their predecessors. Both ships joined the fleet in 1916.

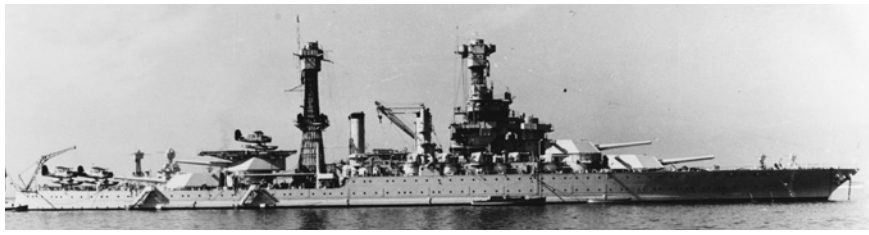
As war raged in Europe, Congress approved a succession of 'standard-type battleships', which were laid down from early 1915 onwards. It was intended that the New Mexico-class super-dreadnoughts (*New Mexico*, *Mississippi* and *Idaho*) would mount 16in guns, in five twin turrets, arrayed like the New York class, but financial and political constraints led to them being virtual duplicates of the Pennsylvanias, with only minor improvements. New Mexico, though, was used to test turbo-electric drive. The two-ship Tennessee class (*Tennessee* and *California*) were also copies of the New Mexico class, only with improved underwater protection, and powered by turbo-electric drives, rather than steam turbines. This would be standard for all future battleship propulsion systems in the US Navy.

Although both ships of the Tennessee class were laid down during the war, the fighting was long over by the time they were launched. In fact, it would be the summer of 1921 before both of them entered service. By then, the last of the standard-type battleships had been approved, although their final design featured a significant change. Essentially, the Colorado class of four 'super-dreadnoughts' would be a repeat of the Tennessee class, with similar armour, propulsion systems, dimensions and displacement. However, in place of the triple turrets of 14in guns fitted in their predecessors, these ships would mount 16in guns, in four twin turrets.

The 16in (40.6cm) 45-calibre Mark I gun had first been developed by the US



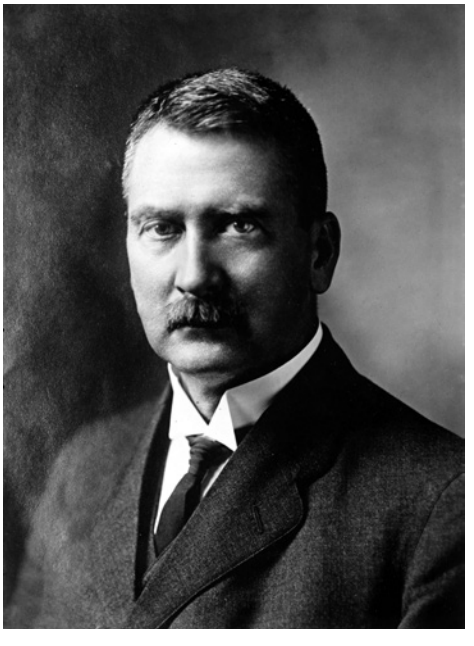
The US Pacific Fleet, pictured in the 1920s. The increasing threat posed by Imperial Japan led to the creation of *War Plan Orange*, a scheme which, in the event of hostilities, would see these Colorado-class battleships take on their Japanese counterparts. The embarked floatplane in the foreground is a Vought O2U Corsair.



The USS *West Virginia* (BB-48), a Colorado-class super-dreadnought, entered service in December 1923. *West Virginia* was one of only three of the 16 Colorado, South Dakota or Lexington classes to join the fleet as battleships and went on to serve throughout World War II.

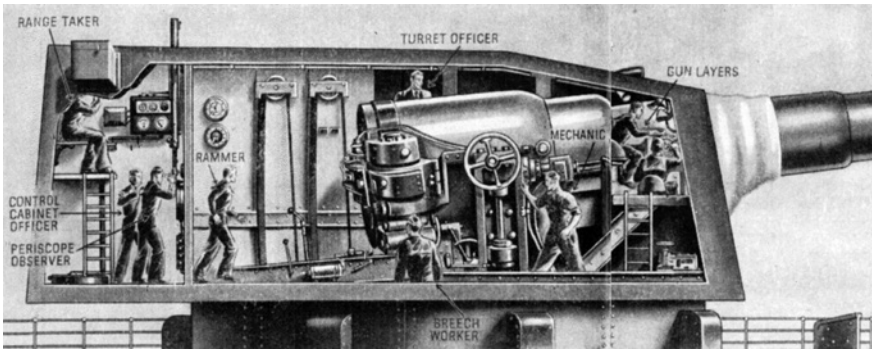
Bureau of Ordnance in 1913, and was test-fired a year later. It went into production in early 1917, despite reservations that it would render the older dreadnoughts obsolete. Reports of similar guns being developed by other maritime powers led to a change of heart. The four-ship Colorado class (*Colorado*, *Maryland*, *Washington* and *West Virginia*) would be the first ships armed with this potent new weapon. Only *Maryland* was laid down before the war ended, and she was the only ship in the class to be commissioned before the Washington Treaty was signed. Of the others, only *Colorado* and *West Virginia* would be completed, in late 1923. The fourth ship, *Washington*, was cancelled while she was fitting out, and in late 1924 her hulk was expended as a target, while anchored off Long Island.

By 1917, when the Tennessee class was being built, work began on the design of a 'fast battleship', capable of matching the speeds of the latest British and Japanese capital ships. The General Board and the C&R Bureau developed plans for them, based around the 16in gun, and these were completed in January 1917. Congress approved the funding for a class of four of these, but in April, when America entered the war, building plans were postponed, to allow existing ships to be completed as rapidly as possible, so they could reinforce the fleet. This, though, allowed the designs to be tweaked, to incorporate the lessons learned from Jutland, and to accommodate new innovations. Approval to continue was finally given after the war, and the namesake of the five-ship class, *South Dakota*, was laid down in New York in March 1920. The others were to be *Indiana*, *Montana*, *North Carolina*, *Iowa* and *Massachusetts*.



The Virginia-born naval architect Rear Admiral David W. Taylor (1864–1940) was head of the US Navy's C&R Bureau from 1914 to 1922. His scientific approach led to the development of more accurately designed warship hulls. He was the architect of the navy's Colorado, South Dakota and Lexington classes of 16in-gun capital ships.

All five ships were laid down between early 1920 and early 1921. Construction progress was slow, though, largely because the Washington Conference cast a shadow over naval construction. In the end, following the signing of the Washington Treaty on 6 February 1922, all five ships were cancelled. The South Dakota class of 1920 were therefore the fast battleships the US Navy never had. They would have carried a similar all-or-nothing armour scheme to the previous class of 'standard-type' battleships, but it was slightly improved by the addition of extra armoured bulkheads and added protection around the vessels' large funnel uptakes. They would be 60ft longer than their predecessors, though, and around 10,000 tons heavier. This meant they needed more propulsive power. This was provided by turbo-electric drive, linked to a dozen boilers, which generated around 50,000shp, and would have given these ships a top speed of 23 knots.



The interior of a triple 16in gun turret, emphasizing the sheer bulk of these gun breeches. The 16in (40.6cm) 45-calibre Mark I guns to be mounted in the British G3 class of 'super-battlecruisers' were 61ft 10in (18.85m) long and weighed 108 tons apiece. Britain's triple turret design was cramped but workable, and after the abandonment of the G3 project, these guns and turrets were used in the Nelson class of post-Washington Treaty battleships.

What really stood out was their appearance and their main armament. A slightly improved 16in, 50-calibre Mark II gun was to be used, which had been designed in 1916. Twelve of these would be mounted in four triple turrets, which would have given the South Carolina class a firepower half as great again as the super-dreadnoughts of the Colorado class. The other distinctive feature was their huge single funnel, uniting four uptakes ('smokepipes') rising from the boiler rooms. Another difference was the planned secondary armament of 16 6in guns in individual casemates, an increase in calibre on those fitted in earlier American battleships. In the end, as these ships were never built, their full effectiveness can't be judged. However, given the growing post-war threat posed by Japan, it was expected that these would be more than capable of taking on their Japanese Kaga- and Kii-class counterparts.

Despite their popularity in Britain, Germany and Japan, the United States never favoured the concept of the battlecruiser. However, the launch of the British battlecruiser *Hood* in 1918 impressed American naval observers, at a time when the General Board was becoming concerned by the rapid growth of Japanese naval power, and the rumours that the Japanese planned to build their own Amagi class battlecruisers armed with 16in guns. However, as early as 1912 the General Board had considered building an American class of battlecruiser or fast battleship, a reaction to the commissioning of the Kongo class into the Imperial Japanese Navy. Funding though, delayed the development of these plans for several years. In the end, they were resurrected after the end of the war, by which time they had become extremely powerful scouting ships, rather than a conventional battleship.

These were given the title of the Lexington class, a series of five long, sleek battlecruisers, which carried eight 16in, 50-calibre Mark III guns apiece, in four twin turrets. These were more akin to scaled-up cruisers than anything else, albeit with a 7in armoured belt, and unsurprisingly resembled the *Hood*, whose appearance had so impressed American naval observers. Like *Hood* they were extremely long, with an overall length of 874ft. Unlike her though, they were powered by turbo-electric drive, which would have given these battlecruisers an impressive maximum speed of 33½ knots. Their five funnels or smokestacks, however, gave them the appearance of a cruiser rather than a capital ship. Their real limitation, though, was their weak armour, which reflected their role as 'battle scouts'. The designers argued that if the magazines, turrets and barbettes were well-protected, the failures of the British battlecruisers at Jutland wouldn't be repeated. The armour was also sloped, to make the most of what protection there was.

The first of the six Lexington-class battlecruisers was laid down in the late summer of 1920, and by the following summer all six were under construction. As with the South Dakota-class battleships, building work was slow on account of the impending Washington Conference, and of a general view that battlecruisers were an obsolete form of warship. Plans were even developed at this stage to convert them into aircraft carriers. Interestingly, in the aftermath of the Washington Treaty of February 1922, the building of the ships was halted, but the decision to scrap the ships was postponed. This was to allow various alternative uses for their hulls to be considered. In the end, *Constellation*, *Ranger*, *Constitution* and *United States* were finally cancelled in August 1923. The two closest to completion, *Lexington* and *Saratoga*, were spared the axe, and were earmarked for conversion into aircraft carriers.

THE WASHINGTON NAVAL TREATY

Most historians agree that one of the prime contributory factors for the starting of World War I was the naval arms race between Britain and Germany. Ostensibly to prevent such a thing happening again, the world's five main maritime powers met in Washington in 1921, to conduct disarmament negotiations. When the war ended, Britain still had the world's most powerful navy, but the American fleet almost matched it, while Japan, France and Italy were still relatively minor naval powers. The risk of another naval arms race between these former Allies threatened relations between them, particularly in the wake of America's rapid naval expansion. For the most part, the public in all five countries opposed further military expenditure, but while Britain was financially weak after the war, America and Japan had emerged with strengthened economies. So, when the American administration suggested holding disarmament talks, the British acceded. The other three powers then fell into line.

The first discussions were held on 21 November 1921. The Americans proposed a ten-year 'holiday' on the building of new capital ships, and the suspension of all existing construction. In addition, a balance between the capital ships and secondary vessels of the five powers would be established, measured in tonnage, with a 5, 5, 3, 1.7 and 1.7 ratio between the British, American, Japanese, French and Italian fleets respectively. While the British government readily agreed to this, the Admiralty didn't, as it would make

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USS *CONSTELLATION*, AN AMERICAN LEXINGTON-CLASS BATTLECRUISER, *C.*1930

The US Navy was slow to adopt the concept of battlecruisers. The US Navy General Board recognized their limitations and vulnerabilities. However, the development of the Japanese Kongō class led to a scheme to develop similar ships, to act as fast scouts for the US battlefleet. Like the British G3s, these were more akin to 'fast battleships' than battlecruisers, but the US Navy was also influenced by the design of HMS *Hood*. So, at war's end, plans were developed for an American battlecruiser. Several forms of what was to be the Lexington class were considered, including one which more readily resembled contemporary cruisers. This four-funnel configuration was eventually abandoned in favour of a two-funnel design, influenced in part by the design of late-war German battlecruisers as seen in this depiction of the USS *Constellation* (Fig. 1). The Lexingtons would carry a similar main gun armament to the new Colorado class of battleships, but the ships themselves were more lightly built, with less protection. This allowed them to attain a projected speed of more than 32 knots. In the end, thanks to the Washington Treaty, only two of the six Lexingtons were built. Even these weren't built as battlecruisers, but as aircraft carriers including the USS *Saratoga* (Fig. 2).

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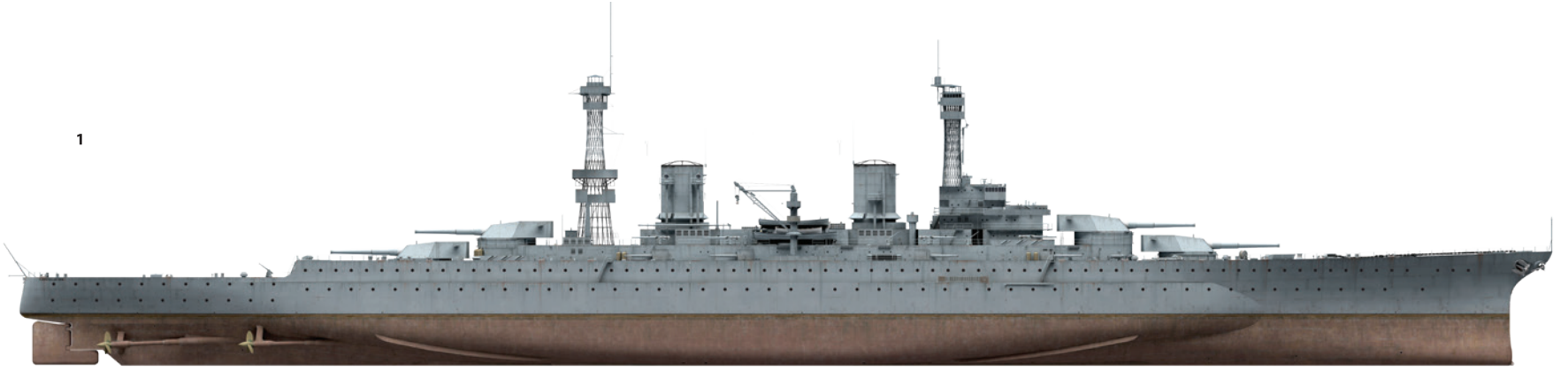

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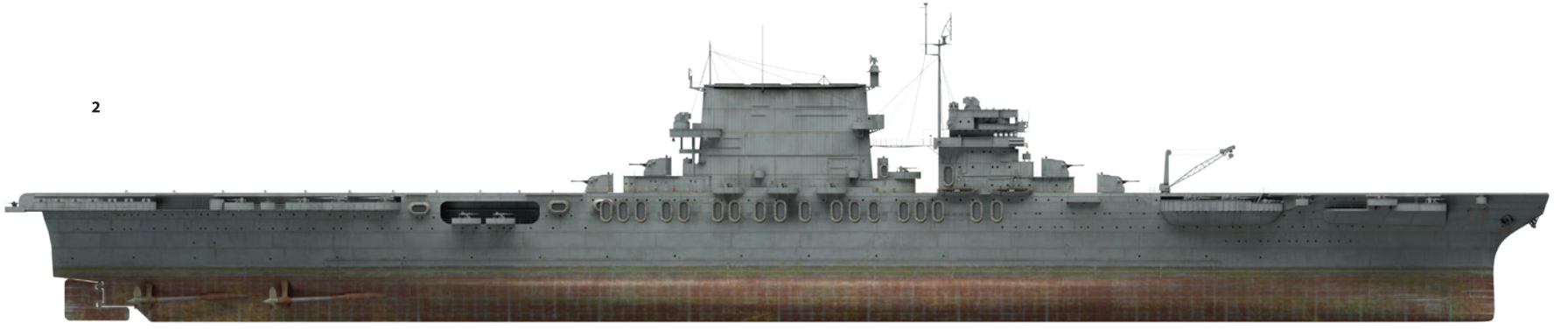
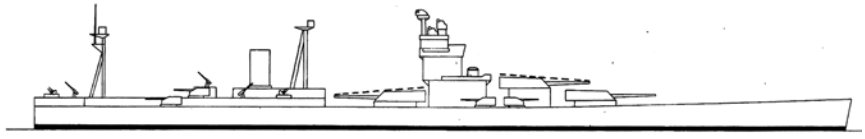




Although the British Admiralty's plans for its four N3-class super-battleships were never fully completed, these lines show the basic features of the design, based around three triple 18in gun turrets. The dashed lines indicate the possible positions of turret-top flying-off platforms for small floatplanes.

it hard to maintain fleets at home as well as in the Mediterranean and the Far East. The Japanese were reluctant too, as they wanted a stronger fleet to oppose any future American aggression. The Italians were happy, but the French resented their small ratio, compared to the Japanese. However, all the powers agreed to the principles of the American proposal – it was just the details that bothered them.

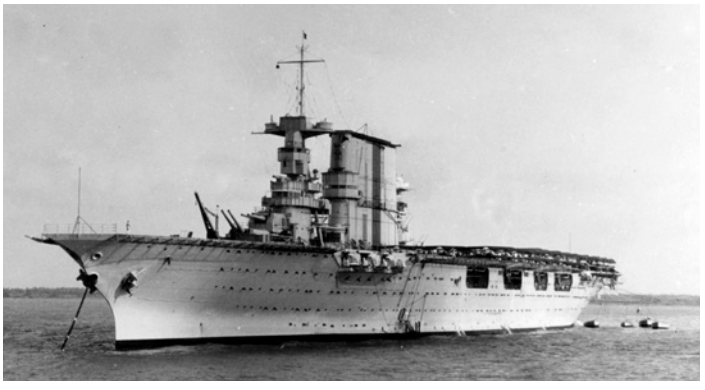
There were problems with individual warships or classes, so some degree of diplomatic trading was required to reach agreement. The British, for instance, refused to accept the same ratio limit for cruisers, as these formed the backbone of their trade protection fleet. A compromise was reached where ship size and armament calibre would be restricted. A British attempt to abolish submarines was rejected, and in the end no agreement on submarine strength of construction was reached. Japan was more concerned with the other powers establishing naval bases in the Pacific region. Eventually it was agreed that Britain and the United States would continue to operate their established bases in Singapore, the Philippines and Hawaii, but expansion beyond this wouldn't take place. This effectively allowed the Japanese to become the dominant naval power in south-east Asian and west-central Pacific waters. This agreement though, led to Japan's approval of the other terms of the treaty.

The triple 16in gun mountings adopted by the Royal Navy for the G3 battlecruiser proved troublesome when fitted in the battleships *Nelson* and *Rodney*. These issues were eventually ironed out, but the turret was still cramped, and this – together with the lengthy mechanical procedures to improve safety – reduced their rate of fire to a tardy round per minute.

One area of contention remained – the size and composition of the countries' battlefleets. Political and financial pressure forced the Admiralty to accede to its government's diplomatic demands, and so it was forced to accept a major reduction in fleet strength. That effectively meant the Admiralty also had to accept future parity with the US Navy. While there was no real risk of war between America and Britain, this rankled as it effectively ended a naval dominance that had lasted for two centuries. The Japanese and the Americans were more likely to clash in a future naval war. In fact, the United States had already drawn up *War Plan Orange*, its plans for a future war in the Pacific. Still, the concession over bases helped mollify the aggressive wing of the Japanese delegation, and it helped avoid any future arms race between the two Pacific powers.

With the negotiations completed, the Washington Naval Treaty was finally signed on 6 February 1922. While it could be seen as a victory for cash-strapped British politicians, the Admiralty was furious at losing most of its battlefleet, and its global position. France and Italy had little diplomatic clout at the conference, but like Britain their economies had suffered as a result

of the war, and their delegations were happy with what they'd achieved, even if it didn't please advocates of stronger navies. The Japanese were reasonably content, as it guaranteed their sphere of influence in the Pacific, and allowed their fleet to expand in new ways, through the development of naval aviation. The real beneficiaries, though, were the Americans. Not only had they been guaranteed naval parity with Britain, which made their wartime naval expansion worthwhile, but it also appeased the strong political demand for disengagement from world politics. All in all, everybody compromised, but ended with something they felt was vital to their own national interests.



The USS *Saratoga* (CV-03) was the second of the Lexington-class battlecruisers to be spared the breaker's yard in the aftermath of the Washington Treaty. This photograph was taken soon after *Saratoga* joined the fleet in late 1927. Her clipper bow and elegant lines are all that remained of the original 'super-battlecruiser'.

In terms of naval construction, though, the Washington Naval Treaty put an end to the building of the hugely expensive super-battleships that threatened to spark another naval arms race. In Britain, this meant the building of the four G3 battlecruisers and four N3 battleships. For the United States, it was the South Dakota class of six battleships and the Lexington class of six battlecruisers. The Japanese lost their two Kaga-class and four Kii-class battleships, and the four Amagi- and four No. 13-class battlecruisers. Both Japan and the United States were fortunate in that under the terms of the treaty, two each of their cancelled ships were allowed to be converted into aircraft carriers.

For its part, France had laid down five super-dreadnoughts in 1913–14, but these had never been completed. These already obsolete Normandie-class dreadnoughts were scrapped, as were plans for four Lyon-class super-dreadnoughts, the development of which had in any case been quietly abandoned in August 1914. Other ships had been designed, including fast battleships, but these never progressed beyond the drawing board. The Italian *Regia Marina* achieved more during the war, as between 1914 and 1915 four fast battleships had been laid down, which were broadly similar to the British Queen Elizabeth class. However, progress was halted when Italy entered the war in 1915. One of them, the *Francesco Caracciolo*, was launched in 1920, but in early 1921 she and her three half-built sister ships were scrapped on the stocks, due to a lack of funds.

Both the battleships of the South Dakota class and the battlecruisers of the Lexington class were to be armed with these 16in (40.6cm) 50-calibre Mark II Model I guns. This barrel was built in the Washington Naval Yard, where it is now displayed. These guns had a rate of fire of two rounds a minute and an effective range of up to 17 miles. At that range, their armour-piercing shells were expected to penetrate 13in of armour.

The *South Dakota*, namesake of her class, under construction in the New York Naval Yard. Work began on the super-battleship in March 1920 but progress was slow, and the *South Dakota* wasn't even ready to be launched when work was frozen when the Washington Conference began. This view shows the barbettes of her superfiring forward turrets. Their 16in 50-calibre guns were never mounted.

For the Royal Navy though, the Washington Naval Treaty meant the culling of its battlefleet. In fact, the process had already started. *Dreadnought* had been decommissioned in the spring of 1920 and was sold for scrap in May 1921. By the time the treaty had been signed, four of the oldest 12in-gun dreadnoughts had also been scrapped, and six more would follow before the end of 1922, together with four battlecruisers. The cull continued, and between 1923 and 1928 six more dreadnoughts and two battlecruisers would be disposed of. A few super-dreadnoughts remained for a few years in reserve roles, but they no longer formed part of the active fleet. What remained of the battlefleet were the ten 15in-gun battleships of the Queen Elizabeth and Royal Sovereign classes, three battlecruisers (*Hood*, *Repulse* and *Renown*), and the three light battlecruisers that had been converted into aircraft carriers.

In a way, though, something remained of Britain's abandoned super-battleships. Their designs survived, and the terms of the treaty allowed the British to build two new battleships, albeit ones which displaced no more than 35,000 tons and were armed with 16in guns. So, in the summer of 1922, heavily modified versions of the G3 and N3 plans were produced, and these were duly approved by the Admiralty. These smaller, slower and heavily altered super-battleships were laid down in December 1922 and would enter service five years later as the two-ship Nelson class. Anyone looking at the plans of the G3 and N3 ships will notice the similarity with these truncated, slow, ugly but still powerful offshoots. With their thick armoured protection and powerful armament, *Nelson* and *Rodney* would serve the Royal Navy well throughout World War II. One can only wonder, though, what a G3 or N3 version of them might have achieved, if they had ever been built.

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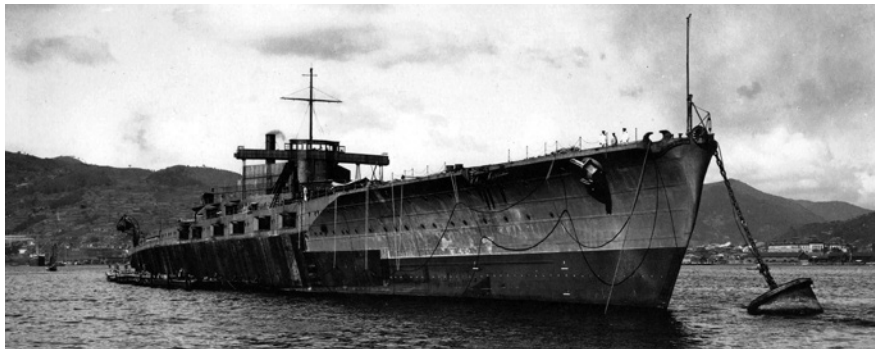
THE US BATTLE FLEET PREPARING FOR *WAR PLAN ORANGE*, C. 1934

In the aftermath of World War I, the US Navy was faced with a growing naval threat from Japan, which continued to expand its fleet while flexing its diplomatic muscles in the Pacific. As a result, the US Army and the Navy Board developed *War Plan Orange* which involved a potential war with Imperial Japan. This had been developed during the 1920s, and by early 1929 a basic war plan had been produced. Extensive wargames and exercises in 1933 revealed flaws in the American strategy, and so *War Plan Orange* was revised, and the US Navy's base at Pearl Harbor in Hawaii enlarged, as the obvious starting point of any American operation. This scene envisages a US Navy exercise in the Central Pacific, testing its ability to scout out and engage the Japanese Fleet. In the foreground is the Lexington class battlecruiser USS *United States*, while in the distance, off the battlecruiser's starboard beam, is a South Dakota class battleship. This depiction also surmises that the logical plan to convert two of these Lexington class into aircraft carriers went ahead, as it did in the 1920s. So, astern of the battlecruiser is an attached aircraft carrier, the USS *Saratoga*. Above the surface ships, an air strike made up of Vought Corsair SBU-1 dive bombers has formed, escorted by Grumman F2F and Boeing F4B fighters. At this stage, naval air power was in its infancy, but the US Navy as well as Japan had realized its importance in any future war in the Pacific.

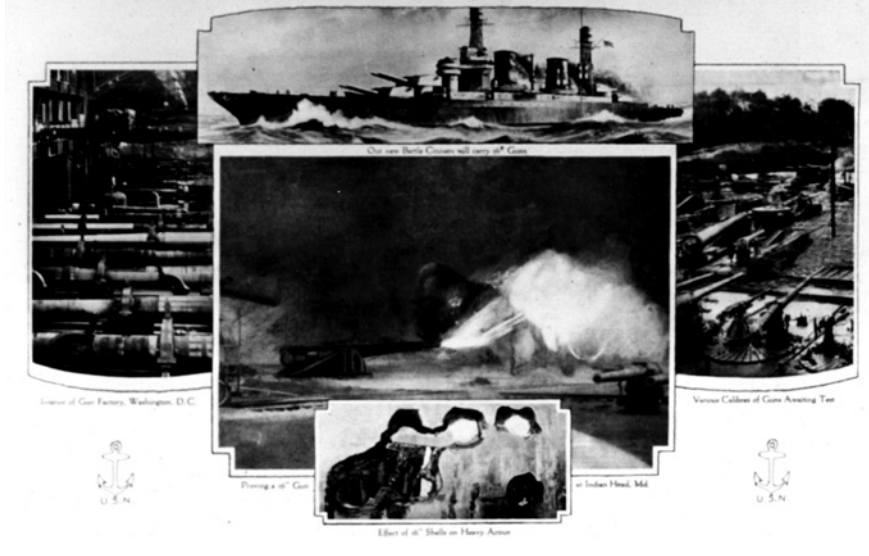


The Kaga-class 'super-battleship' *Tosa*, launched in December 1921, is pictured at anchor off Nagasaki after work on her was halted in February 1922, following the signing of the Washington Treaty. So, her powerful armament of ten 16in guns were never fitted. Instead, *Tosa* was sunk as a target ship in early 1925.

SUPER-BATTLESHIP CONSTRUCTION

The Washington Naval Conference came about because by the early 1920s, it was clear that unless something was done, the three leading naval powers could be dragged into a new naval arms race in order to maintain their global standing, and to counter the development of new capital ships by their rivals. This, though, flew in the face of the new post-war reality, where the public favoured disarmament, rather than the building of ever more expensive warships. In 1919, Britain's Grand Fleet had been disbanded, and many of its older warships were paid off and placed in reserve. Both the Americans and the Japanese did the same, and in the aftermath of the 'War to end all Wars' there seemed little need in maintaining powerful and expensive battlefleets. This was particularly true for Britain, as the Grand Fleet's great rival, the German High Seas Fleet, was lying at the bottom of Scapa Flow.

However, the temporary elimination of Germany as a naval power did nothing to alter the global situation – the need to maintain a powerful fleet to protect maritime trade, or as the Americans put it, the need to preserve the 'Freedom of the Seas'. This was accompanied by the growth of geopolitical rivalry between America and Japan in the Pacific, and Britain's determination to maintain a foothold in the Far East. Even as the war ended, both America



In 1919, the Naval Recruiting Bureau in New York produced a series of posters, aimed at enticing recruits into the US Navy. This 'What the Navy is Doing' poster dealt with the design and production of the 16in 50-calibre guns produced for use in the navy's new super-battleships and battlecruisers.

and Japan were engaged in a naval arms race, and both countries were developing plans to build larger and more powerful capital ships. The British Admiralty saw this as a threat to its naval supremacy, and so felt compelled to follow suit. It was this snowball effect of naval construction that led to the political call to discuss the situation, and to try to find a way out of this costly and unwanted rivalry. In the meantime, the naval architects, ordnance experts and naval high commands all continued to develop these super-battleships, and in some cases began building them.

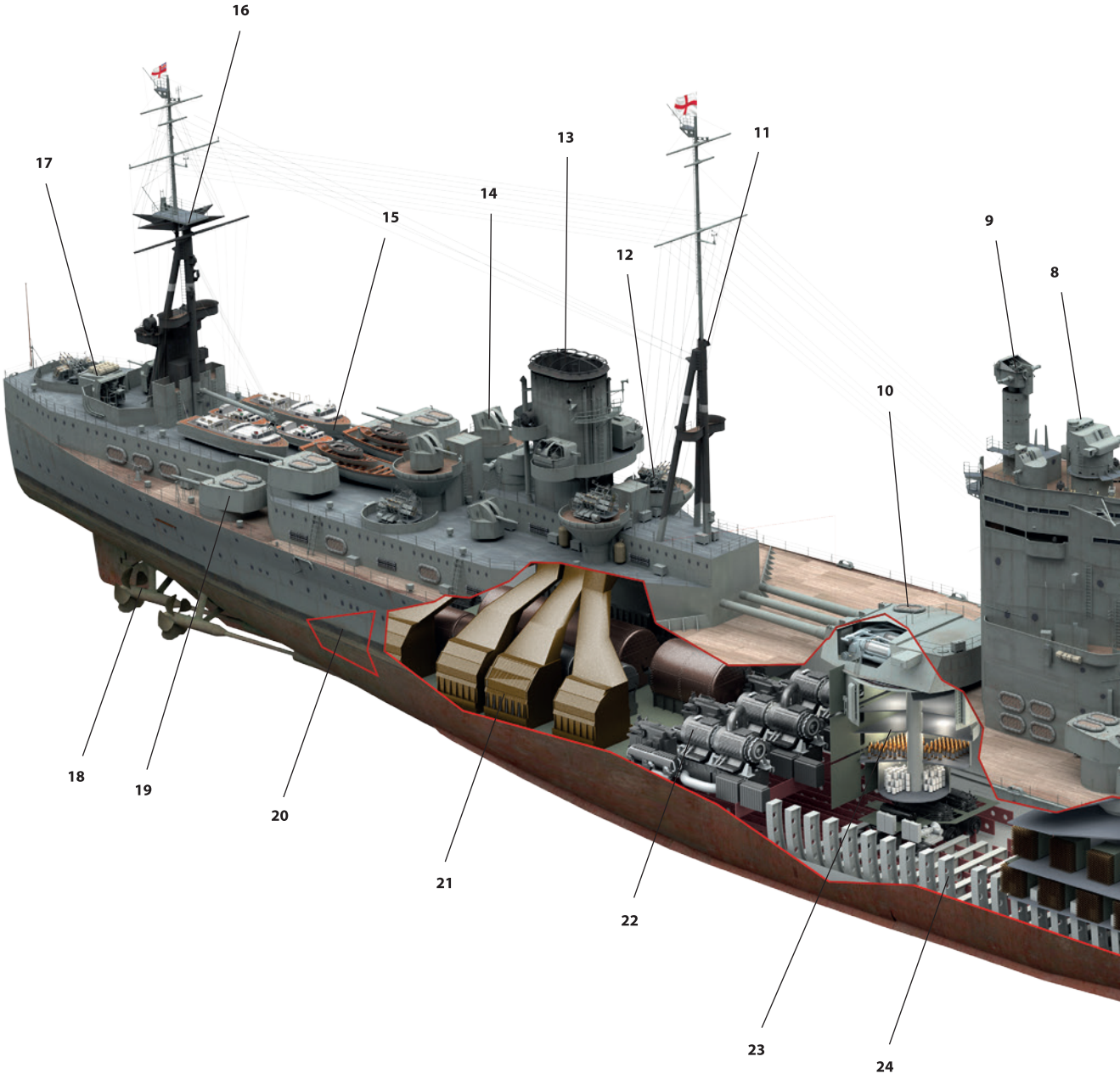
Like the Colorado class which preceded them, the South Dakota-class super-dreadnoughts and Lexington-class super-battlecruisers were designed to carry a main armament of 16in guns. This shows the forward turrets of USS *Colorado* firing during a wartime exercise in October 1943. These powerful weapons were more effective than the 14in guns previously mounted in American super-dreadnoughts. With minor variations, they remained in use until 1991.

Great Britain

The basic design for the G3-class battlecruiser was accepted by the Admiralty Board in February 1921, and the final version was approved that August. Orders were drawn up and placed in late October. Names for the four battlecruisers had never been decided by the Admiralty, and they were simply referred to as No. 1 to No. 4. However, by the end of 1921, two options were up for consideration. One was based on the patron saints of the countries that made up the United Kingdom, *St Andrew* for Scotland, *St David* for Wales, *St George* for England and *St Patrick* for Ireland, or more accurately Northern Ireland, following the partition of Ireland that May.

The other option, and probably the leading contender, was the reuse of the names of earlier battlecruisers. These were *Invincible, Inflexible, Indomitable* and *Indefatigable*. Two of these names, *Invincible* and *Indefatigable* had last been given to battlecruisers which had been sunk at Jutland five years before. The remaining two, *Inflexible* and *Indomitable*, belonged to existing 12in-gun battlecruisers, which had been decommissioned the previous year, and were then lying in reserve at the Nore. Both were eventually sold for scrap and were broken up in 1922. This meant these names were free to be used for the new G3 battlecruisers, if they were built.

G3-class battlecruiser specifications	
Displacement	48,400 tons (standard), 53,909 tons (deep load)
Dimensions	Length: 856ft (260.9m) overall
	Beam: 106ft (32.3m)
	Draught: 35ft 8in (10.9m)
Propulsion	Four propeller shafts, 4 single-reduction geared steam turbines, 20 small-tube boilers, generating 160,000shp
Maximum speed	31–32 knots
Fuel oil capacity	5,000 tons
Protection	Belt: 12in–14in (30.5–35.5cm)
	Bulkheads: 10in–12in (25.5–30.5cm)
	Decks: 4in–8in (10–20cm)
	Turret (faces): 17in (43cm)
	Conning tower: 10in–14in (25.5–35.5cm)
Armament	9 x 16in (40.6cm) 45-cal. Mk I guns in three triple turrets
	16 x 6in (15.2cm) 50-cal. Mk XXIII guns in eight twin turrets
	6 x 4.7in (12cm) 43-cal. AA guns in six single mounts
	40 x 2pdr (4cm) pom-pom AA guns in ten quadruple mounts
Complement	1,716 officers and men



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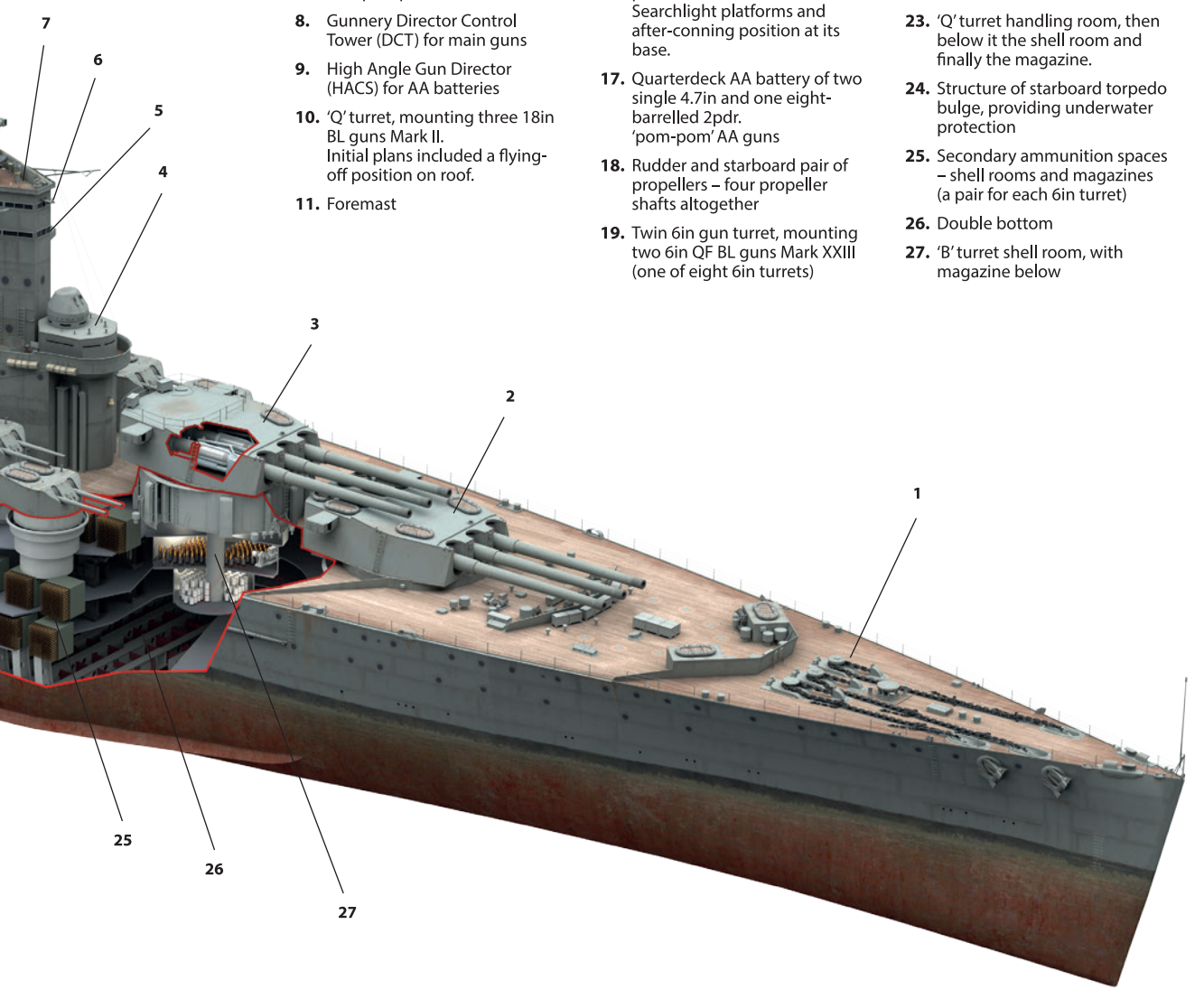
HMS *ST GEORGE*, A BRITISH N3-CLASS BATTLESHIP, C.1931

As well as the G3 class of battlecruisers, the British Admiralty also ordered its Director of Naval Construction to draw up plans for a new class of four battleships. Several variants were considered, with a variety of layouts of the main battery. In the end, they opted for a layout which was broadly similar to the G3 battlecruisers, which they hoped to begin building in late 1921. With the N3 class though, the speed of the vessels was reduced to conform to the slower speed of the existing battlefleet – between 21 and 23 knots. The protection of the N3 battleships was markedly increased, although the all-or-nothing configuration of the G3 battlecruisers was also used. This meant the thickest belt was concentrated around the main gun magazines, plus the engine and boiler rooms. What really would have set these ships apart though, was their impressive armament of nine 18in guns, in three triple turrets. However, when the N3 design was being drawn up, the 18in Mark II gun was still experimental, and its design had been problematic. So, although the Admiralty opted for these mammoth guns, the problems of blast damage to the ship when fired, as well as their reliability, had still to be overcome. In the end, both the ship class and their guns were abandoned in the wake of the Washington Treaty.

KEY

1. Forecastle, anchor cables and steam capstan
2. 'A' turret, mounting three 18in BL guns Mark II
3. 'B' turret, mounting three 18in BL guns Mark II – showing turret interior
4. Conning tower
5. Captain's bridge
6. Admiral's bridge
7. Compass platform
8. Gunnery Director Control Tower (DCT) for main guns
9. High Angle Gun Director (HACS) for AA batteries
10. 'Q' turret, mounting three 18in BL guns Mark II. Initial plans included a flying-off position on roof.
11. Foremast
12. 'Multiple pom-pom' 2pdr (40mm) QF Mark V III (one of five eight-barrelled mountings)
13. Funnel, flanked by secondary gun directors and searchlight positions
14. 4.7in AA gun in single mount (one of six)
15. Boat deck
16. Mainmast, with spotting platform. Searchlight platforms and after-conning position at its base.
17. Quarterdeck AA battery of two single 4.7in and one eight-barrelled 2pdr. 'pom-pom' AA guns
18. Rudder and starboard pair of propellers – four propeller shafts altogether
19. Twin 6in gun turret, mounting two 6in QF BL guns Mark XXIII (one of eight 6in turrets)
20. After end of 15in belt armour, reducing to 13.25in below waterline
21. Starboard boiler rooms and boiler uptakes – four boiler rooms in all, each with two boilers
22. Starboard turbine room – two turbine rooms in all, each with two turbines. Aft of each turbine room was a Gearing room, lining the turbines and the boilers.
23. 'Q' turret handling room, then below it the shell room and finally the magazine.
24. Structure of starboard torpedo bulge, providing underwater protection
25. Secondary ammunition spaces – shell rooms and magazines (a pair for each 6in turret)
26. Double bottom
27. 'B' turret shell room, with magazine below



The shipyards allocated for the new battlecruisers' construction were William Beardmore & Co., John Brown & Co. and Fairfield Shipbuilding & Engineering Co. on Clydeside and Swan Hunter on Tyneside. The latter, though, was unable to produce all of the propulsion system themselves, and so the work was subcontracted to C.A. Parsons & Co., also on Tyneside, who were world leaders in the production of marine steam turbines and boilers. The laying down of these ships was delayed for two reasons. First the government was awaiting the outcome of the Washington Conference, which might well lead to the cancellation of these ships. Just as importantly, the Admiralty still had to secure funding for their construction. In the end, the orders were cancelled on 13 February 1922, before any of the four battlecruisers had even been laid down.

N3-class battleship, HMS St George, specifications (due to be laid down in late 1922, and commissioned by 1928)	
Displacement	48,500 tons (standard), est. 54,000 tons (deep load)
Dimensions	Length: 820ft (250m) overall Beam: 106ft (32.3m) Draught: 35ft 8in (10.9m)
Propulsion	Four propeller shafts, 4 single-reduction geared steam turbines, 20 Yarrow small-tube boilers, generating more than 56,000shp
Maximum speed	23–23½ knots
Fuel oil capacity	Undecided
Protection	Belt: 13¼in–15in (34–38cm)
	Bulkheads: 14in (35.5cm) 13¼in–15in (34–38cm)
	Decks: 8in (20cm)
	Turret (faces) 18in (46cm)
	Conning tower: 15in (38cm)
Armament	9 x 18in (45.7cm) 45-cal. Mk II guns in three triple turrets
	16 x 6in (15.2cm) 50-cal. Mk XXII guns in eight twin turrets
	6 x 4.7in (12cm) 43-cal. AA guns in six single mounts
	40 x 2pdr (4cm) pom-pom AA guns in five eight-barrelled mounts
Complement	Undecided

The second part of the Admiralty's plan to modernize the post-war fleet was the building of the four N3-class battleships. If funding for the project was found, these were due to be laid down in 1922, but planning for them was not as well advanced as the battlecruisers. So, in February 1922, before the final designs had been completed, and set before the Admiralty Board for approval, the decision was made to cancel these ships' construction. Even if the Washington Naval Treaty hadn't led to the cancellation of this project, in the aftermath of the war Britain was so cash-strapped that it was extremely unlikely that the British treasury would have approved the funding of this project. They remain, though, in their half-finished form, a glimpse of what might have been – Britain's possession of four of the most powerfully armed battleships in the world, and the largest ever built for the Royal Navy.

N3-class battleship specifications	
Displacement	48,500 tons (standard), est. 54,000 tons (deep load)
Dimensions	Length: 820ft (250m) overall
	Beam: 106ft (32.3m)
	Draught: 35ft 8in (10.9m)
Propulsion	Four propeller shafts, 4 single-reduction geared steam turbines, 20 Yarrow small-tube boilers, generating more than 56,000shp
Maximum speed	23–23½ knots
Fuel oil capacity	Undecided
Protection	Belt: 13¼in–15in (34–38cm)
	Bulkheads: 14in (35.5cm)
	Decks: 8in (20cm)
	Turret (faces): 18in (46cm)
	Conning tower: 15in (38cm)
Armament	9 x 18in (45.7cm) 45-cal. Mk II guns in three triple turrets
	16 x 6in (15.2cm) 50-cal. Mk XXII guns in eight twin turrets
	6 x 4.7in (12cm) 43-cal. AA guns in six single mounts
	40 x 2pdr (4cm) pom-pom AA guns in five eight-barrelled mounts
Complement:	Undecided

Imperial Japan

The Japanese drive to build a small but balanced fleet placed a heavy burden on the country's finances. However, the country still managed to produce a steady trickle of well-designed battleships and battlecruisers, which pushed the naval architects in other countries to improve their own designs. The Kongō-class battlecruiser, for example, was better protected than many of its foreign counterparts, while the Fuso-class battleships were faster than dreadnoughts in American or British service. The Kaga-class battleships were improvements of the earlier Nagato design, with a greatly improved layout of armour – the result of an analysis of Jutland. These would have been powerful additions to the Imperial Navy, but the two battleships of the class had the misfortune of being launched in late 1921, just as the Washington Naval Conference was under way. As a result, work on them was halted on 5 February 1922.

They remained on the stocks, and in April 1924 *Tosa* was cancelled, and her guns handed over to the army for use in coastal defence batteries. The hulk was then used as a gunnery target and sunk in February 1925. *Kaga* though, was spared a similar fate thanks to the Tokyo earthquake of September 1923. The battlecruiser *Amagi*, which had been earmarked for conversion into an aircraft carrier, was damaged beyond repair. So, *Kaga* was converted in her stead, and was completed in 1928. The other battleship victims of the conference were the four ships of the Kii class, which were a merger of the battleship and battlecruiser.

Kaga-class battleship specifications	
Displacement	42,600 tons (standard), est. 48,500 tons (deep load)
Dimensions	Length: 760ft (231.7m) overall
	Beam: 100ft (30.5m)
	Draught: 30ft 10in (9.4m)
Propulsion	Four propeller shafts, 4 geared Brown-Curtis steam turbines, 12 Kampon boilers (8 oil-firing, 4 mixed-firing), generating 91,000shp
Maximum speed	26½ knots
Fuel capacity	Oil: 3,600 tons
	Coal capacity: 1,700 tons
Range	5,500 n. miles at 16 knots
Protection	Belt: 11in (28cm) sloped
	Bulkheads: 9in–11in (22.9–28cm)
	Decks: 4 (10.2cm)
	Turret (faces): 12in (30.5cm), (sides): 9in (22.9cm)
	Barbettes: 9in–12in (22.9–30.5cm)
	Conning tower: 14in (35.6cm)
Armament	10 x 16in (40.6cm) 45-cal. guns in five twin turrets
	20 x 5.5in (14cm) 50-cal. guns in single casemate mounts
	4 x 3.1in (7.9cm) AA guns in four single mounts
	8 x 24in (61cm) torpedo tubes above waterline in single mounts
Complement	1,333 officers and men

Kii-class battleship specifications	
Displacement	42,600 tons (standard), est. 48,500 tons (deep load)
Dimensions	Length: 820ft (250m) overall
	Beam: 101ft (30.8m)
	Draught: 31ft 9in (9.7m)
Propulsion	Four propeller shafts, 4 geared Gijutsu-Hombu steam turbines, 19 Kampon mixed-firing boilers, generating 131,200shp
Maximum speed	29¾ knots
Fuel capacity	Oil: 3,900 tons
	Coal capacity: 2,500 tons
Range	8,000 n. miles at 14 knots
Protection	Belt: 11½in (29.2cm) sloped
	Bulkheads: 2⅞in (7.3cm)
	Decks: 4⅝in (12cm)
	Turret (faces): 11in (28cm), (sides): 9in (22.9cm)
	Barbettes: 9in–11in (22.9–28cm)
	Conning tower: 14in (35.6cm)
Armament	10 x 16in (40.6cm) 45-cal. guns in five twin turrets
	16 x 5.5in (14cm) 50-cal. guns in single casemate mounts
	6 x 4.7in (12cm) 45-cal. AA guns in four single mounts
	8 x 24in (61cm) torpedo tubes above waterline in single mounts
Complement:	Undecided

Kii was to be built in the Kure Naval Yard and *Owari* in the naval yard at Yokosuka. The remaining two of the class hadn't received names, and so were known as *No. 11* and *No. 12*. They were earmarked to be built by Kawasaki in Kobe and Mitsubishi in Nagasaki respectively, after the two Kaga-class battleships had been launched. *Kii* and *Owari* were ordered in

October 1921, but had not even been laid down before their construction was halted. Their two unnamed sister ships hadn't even been ordered when they were cancelled in November 1923. *Kii* and *Owari* too were eventually cancelled in April 1924.

Kaga-class battleship history

Ship	Builder	Laid down	Launched	Fate
Kaga	Kawasaki, Kobe	July 1920	November 1921	Work halted, February 1922 Converted into aircraft carrier 1923–28 Commissioned March 1928
Tosa	Mitsubishi, Nagasaki	February 1920	December 1921	Work halted, February 1922 Sunk as gunnery target, February 1925

The Amagi class of four battlecruisers were essentially enlarged versions of the Kaga-class battleships, but with less armour and greater speed. They were laid down in two batches, in late 1920 and then late 1921. With completion expected to take three years, they were all still on the stocks when the Washington Naval Conference began. All work on them stopped on 5 February 1922, and while two were to be scrapped, the terms of the treaty allowed two more to be converted into aircraft carriers. Inevitably, as they were the most complete, *Amagi* and *Akagi* were chosen for conversion.

Amagi-class battlecruiser specifications

Displacement	41,217 tons (standard), est. 47,000 tons (deep load)
Dimensions	Length: 826ft 1in (251.8m) overall
	Beam: 101ft (30.8m)
	Draught: 31ft (9.5m)
Propulsion	Four propeller shafts, 4 geared Gijutsu-Hombu steam turbines, 19 Kampon boilers (11 oil-firing, 8 mixed-firing), generating 131,200shp
Maximum speed	30 knots
Fuel capacity	Oil: 3,900 tons
	Coal: 2,500 tons
Range	8,000 n. miles at 14 knots
Protection	Belt: 10in (25.4cm) sloped
	Bulkheads: 2⅞in (7.3cm)
	Decks: 3⅞in (9.8cm)
	Turret (faces): 11in (28cm), (sides): 6in (15.2cm)
	Barbettes: 9in–11in (22.9–28cm)
	Conning tower: 3in–14in (7.6–35.6cm)
Armament	10 x 16in (40.6cm) 45-cal. guns in five twin turrets
	16 x 5.5in (14cm) 50-cal. guns in single casemate mounts
	6 x 4.7in (12cm) 45-cal. AA guns in four single mounts
	8 x 24in (61cm) torpedo tubes above waterline in single mounts
Complement	Undecided

The other two were cancelled that summer and broken up *in situ* two years later. Work on *Amagi* and *Akagi* was scheduled to begin in late 1923, but that September the Tokyo earthquake struck Yokosuka, and *Amagi* was damaged beyond repair. So, she was cancelled, and was subsequently scrapped on the slipway in April 1924. In her place, the battleship *Kaga*

underwent conversion instead. In Kure, work on the conversion of *Akagi* began in November 1923, and was eventually completed in 1927.

Amagi-class battlecruiser history				
Ship	**Builder**	**Laid down**	**Launched**	**Fate**
Amagi	Yokosuka Naval Yard	December 1920	Never launched	Due to be converted into aircraft carrier in 1923–27, but wrecked in earthquake, September 1923 and cancelled Broken up 1924
Akagi	Kure Naval Yard	December 1920	April 1925 (as aircraft carrier)	Converted into aircraft carrier, 1923–27 Commissioned March 1927
Atago	Kawasaki, Kobe	November 1921	Work halted in February 1922	Cancelled, July 1922. Broken up 1924
Takao	Mitsubishi, Nagasaki	December 1921		Cancelled, July 1922. Broken up 1924

The final batch of Japanese capital ship projects to be cancelled in the wake of the treaty were the No. 13-class battlecruisers/fast battleships. These ships were never given names, but instead were simply referred to by their number. *No. 13* was to be built in Yokosuka Naval Yard, *No. 14* in Kure Naval Yard, *No. 15* in the Mitsubishi shipyard in Nagasaki and *No. 16* in the Kawasaki yard in Kobe. They were all due to be ordered in February 1922 and laid down that summer. All four ships were due for completion in 1927. Instead, all orders were cancelled on 5 February 1922, before work on them had even begun. With their planned armament of eight 18in guns, a speed of 30 knots and an armoured belt 13in (33cm) thick, if built, these would have been among the most powerful warships in the world.

No. 13 battlecruiser specifications	
Displacement	47,500 tons (standard), est. 56,000 tons (deep load)
Dimensions	Length: 900ft (274.4m) overall
	Beam: 101ft (30.8m)
	Draught: 32ft (9.8m)
Propulsion	Four propeller shafts, 4 geared Gijutsu-Hombu steam turbines, 22 Kampon boilers, generating 150,000shp
Maximum speed	30 knots
Fuel capacity	Oil: 3,900 tons
	Coal capacity: 2,500 tons
Range	8,000 n. miles at 14 knots
Protection	Belt: 10in (25.4cm) sloped
	Bulkheads: 2⅞in (7.3cm)
	Decks: 3⅞in (9.8cm)
	Turret (faces): 11in (28cm), (sides): 6in (15.2cm)
	Barbettes: 9in–11in (22.9–28cm)
	Conning tower: 3in–14in (7.6–35.6cm)
Armament	10 x 16in (40.6cm) 45-cal. guns in five twin turrets
	16 x 5.5in (14cm) 50-cal. guns in single casemate mounts
	6 x 4.7in (12cm) 45-cal. AA guns in four single mounts
	8 x 24in (61cm) torpedo tubes above waterline in single mounts
Complement	Undecided

United States of America

For the United States Navy, everything depended on the US Congress. It had reluctantly agreed to continue funding the navy's shipbuilding programme in its 1917 budget, based around a version of the 'standard-type' design of dreadnought battleship. These translated into the ordering of four Colorado-class super-dreadnoughts, the first of which, *Maryland*, was laid down in April 1917. The rest would follow in 1919–20. This late start to their building was largely due to the yards being busy building smaller warships. This late start, though, meant that apart from *Maryland*, none of them had been completed by the time the Washington Naval Treaty was signed. In the end, one of the ships, *Washington* (BB-47), was cancelled while being fitted out, and was sunk as a gunnery and bombing target in late 1924. Few would have realized that these remaining three battleships would be the last to enter service with the US Navy for more than 20 years.

South Dakota-class battleship specifications	
Displacement	43,200 tons (standard), est. 50,400 tons (deep load)
Dimensions	Length: 684ft (208.5m) overall
	Beam: 106ft (32.3m)
	Draught: 33ft (10.1m)
Propulsion	Four propeller shafts, turbo-electric drive, 16 boilers, generating 50,000shp
Maximum speed	23 knots
Fuel oil capacity	Undecided
Range	8,000 n. miles at 10 knots
Protection	Belt: 8in–13.5in (20.3–34.3cm)
	Bulkheads: undecided
	Decks: undecided
	Turret (faces): 18in (45.7cm), (sides): 9in–10in (22.9–25.4cm)
	Barbettes: 13in (33.3cm)
	Conning tower: 16in (30.5cm)
Armament	12 x 16in (40.6cm) 50-cal. guns in four triple turrets
	16 x 6in (15.2cm) 53-cal. guns in single casemate mounts
	4 x 3in (7.6cm) 50-cal. AA guns in four single mounts
	2 x 21in (53.3cm) submerged torpedo tubes in single launchers (on each beam)
Complement	1,191 officers and men

The design of the next battleship class, the South Dakotas, was delayed by the analysis of gunnery information from Jutland, and a consequent adaption of the 'standard-type' design. The result was a 'standard-type' battleship but on a larger scale and mounting its guns in triple turrets. However, design work was frozen for a year or more, as other more ambitious designs were contemplated. As a result, the first of these six battleships was only laid down in January 1920. The others would follow over the next 15 months. This meant then in February 1922, none of them had been launched. As a result, on 8 February all six

The US Fleet at anchor off Colón, at the Caribbean end of the Panama Canal, *c.*1933. It was about to pass through the canal into the Pacific, as part of a large-scale 'wargame' based around the relief of the Philippines, in the event of a war with Japan. During the interwar years, the Pacific increasingly became the focus of the US Navy's strategic attention.

were cancelled, and were sold for scrap late the following year. The exception was *Indiana*, which was broken up on the New York Naval Base slipway.

South Dakota-class battleship history				
Ship	**Number**	**Builder**	**Laid down**	**Fate**
South Dakota	BB-49	New York Naval Yard	March 1920	Cancelled February 1922
Indiana	BB-50	New York Naval Yard	November 1920	
Montana	BB-51	Mare Island Naval Yard	September 1920	
North Carolina	BB-52	Norfolk Naval Yard	January 1920	
Iowa	BB-53	Newport News	May 1920	
Massachusetts	BB-54	Fore River	April 1921	

The delay in beginning work on the six battlecruisers of the Lexington class led to a similar fate. In this case, though, much of the delay was due to the development and housing of a turbo-electric plant with the ability to produce the speeds required by the General Board of the US Navy. The same board was also enamoured by the design of HMS *Hood*, and wanted the plans for these American battlecruisers to adopt some of the features of the new British battlecruiser. The six Lexingtons were eventually laid down in four yards on the Atlantic seaboard between August 1920 and June 1921. As a result, like the South Dakota-class battleships, none of them had been launched by the time the Washington conference was held. Many senior naval officers felt that battlecruisers were a flawed concept and doubted the merits of these new ships.

Lexington-class battlecruiser specifications	
Displacement	43,500 tons (standard), est. 51,217 tons (deep load)
Dimensions	Length: 874ft (266.5m) overall
	Beam: 105ft 4in (32.1m)
	Draught: 31ft (9.5m)
Propulsion	Four propeller shafts, turbo-electric drive, 16 boilers, generating 180,000shp
Maximum speed	33½ knots
Fuel oil capacity	Undecided
Range	12,000 n. miles at 10 knots
Protection	Belt: 7in (17.8cm), bulkheads: undecided
	Decks: undecided
	Turret (faces): 11in (28cm), (sides): 6in (15.2cm)
	Barbettes: 5in–9in (12.7–22.9cm)
	Conning tower: 12in (30.5cm)
Armament	8 x 16in (40.6cm) 50-cal. guns in four twin turrets
	16 x 6in (15.2cm) 53-cal. guns in single casemate mounts
	4 x 3in (7.6cm) 50-cal. AA guns in four single mounts
	8 x 21in torpedo tubes (4 submerged, 4 above waterline), in single mounts
Complement	1,297 officers and men (1,326 if flagship)

This made them prime candidates for cancellation. So, in February 1922 further construction was stopped, pending a final decision on the fate of these ships. The axe finally fell the following August, when all but two of them were cancelled. The half-finished hulls of *Lexington* and *Saratoga* were retained, for conversion into aircraft carriers. The rest were broken up *in situ* before the end of 1923. It is somewhat ironic that these ships were designed

The 'super-battlecruiser' *Lexington* was launched in January 1921, but her fitting out was halted later that year, when she was just quarter-completed. In July, work began on her conversion into an aircraft carrier, and *Lexington* (CV-02) was commissioned in December 1927. She remained a key part of the American carrier fleet until she was sunk during the Battle of the Coral Sea in 1942.

as fast battle scouts. By the time they would have entered service in the late 1920s, that scouting role was already being taken over by aircraft flown from the decks of these two aircraft carriers.

Lexington-class battlecruiser history

Ship	Number	Builder	Laid down	Fate
Lexington	BC-01	Fore River	January 1921	Converted into aircraft carrier
Constellation	BC-02	Newport News	August 1920	Cancelled, August 1923
Saratoga	BC-03	New York SB	September 1920	Converted into aircraft carrier
Ranger	BC-04	Newport News	June 1921	Cancelled, August 1923
Constitution	BC-05	Philadelphia Naval Yard	September 1920	
United States	BC-06	Philadelphia Naval Yard	September 1920	

THE ADAPTABILITY OF THE SUPER-BATTLESHIPS

During World War I, little thought was given to the longevity of dreadnoughts. After all, in Britain they were built during an arms race, while in the United States and Japan the impetus was the desire to build a modern, sizeable fleet.

To anyone looking at the cost of building a dreadnought fleet, it might have seemed like a phenomenal waste of money. For example, the 30,000-ton battlecruiser HMS *Princess Royal*, which fought at Jutland in 1916 was only ten years old when she was broken up for scrap in the aftermath of the Washington Treaty. She had cost the British taxpayer £3 million – the equivalent of £0.5 billion in 2025.

Given their size and firepower, the super-battleships would be considerably more expensive than their wartime predecessors such as the *Princess Royal* and if built would have represented a huge investment, but would almost certainly have remained in service throughout World War II.

While planners at the time had no clear idea what future challenges lay ahead, we know now, with hindsight, that this involved the rapid rise of naval airpower, the growing threat posed by the submarine, and the challenges of fighting a global war from 1939 to 1945. In order to understand what these

modifications after their commissioning might have been, we need to look at those warships which had already been built in the early 1920s, and which still remained in service in World War II.

The Royal Navy

While the bulk of Britain's dreadnought fleet was scrapped in the aftermath of the Washington Treaty, the Admiralty decided to keep its 15in-gun battleships of the Queen Elizabeth and Royal Sovereign classes. Of the five former commissioned in 1915–16, all were modified during the interwar period. The partial refit usually involved adding torpedo bulges, trunking the funnels into one and adding medium (4in) AA guns. The rebuild involved internal gutting and rebuilding, the addition of a new propulsion system, the strengthening of deck armour, the provision of tripod masts, new gun directors, an aircraft hangar and catapult and the adding of a High Angle Control System (HACS) to coordinate AA fire by new batteries of 4in gun turrets and 2pdr pom-poms. HMS *Barham* was never fully rebuilt.

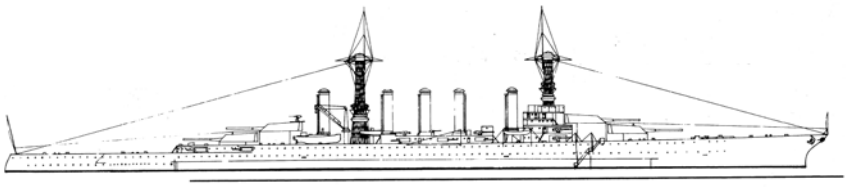
Battleship	Partial modernization	Rebuilding	Fate
Barham	1930–33	-	Sunk November 1941
Malaya	1927–29	1934–36	Scrapped 1948
Queen Elizabeth	1926–27	1937–41	
Valiant	1929–30	1937–39	
Warspite	1924–26	1936–37	Scrapped 1947–56

It was the same for the five battleships of the Royal Sovereign class, although the modifications were less extensive. The exceptions were *Royal Oak* and *Royal Sovereign*, which were modified to a similar extent as the Queen Elizabeths, albeit without the same provision for aircraft.

Battleship	Partial modernization	Rebuilding	Fate
Ramillies	1926–27	1933–34	Scrapped 1948
Resolution	1926–28	1930–31	
Revenge	1925	1931	
Royal Oak	1922–24	1934–36	Sunk October 1939
Royal Sovereign	1927–28	1936–37	Scrapped 1949

The cancellation of Britain's 'super-battleships' due to the Washington Treaty didn't mean the end for their designs. Instead, as the treaty's terms allowed the British to build two new 16in-gun battleships, the designs were redrawn to create plans of the two-ship Nelson class. These shoehorned a lot into the treaty's 35,000-ton displacement limit, and while HMS *Nelson*, shown here, and her sister *Rodney* were ugly, their nine 16in guns packed a powerful punch.

The two Nelson-class battleships (*Nelson* and *Rodney*) built after the Washington Treaty entered service in 1927, and were both modified during their careers in a series of minor refits. These saw the addition of extra AA guns, aircraft catapults – followed by their pre-war removal – and modifications to their superstructure. These though, were all fairly minor alterations, and the battleships entered the war looking much as they had done when they first entered service.



The original design for the Lexington-class battlecruiser looked very different from its final version, with five small funnels and five twin 14in gun turrets. The guns were soon replaced by 16in ones in four turrets, as shown here, while a reworking of the propulsion system led to these funnels being replaced by two larger ones.

For all British battleships, wartime experience led to marked improvements in their AA ability, with the addition of small 20mm and 40mm AA guns, and the provision of radar. This included air warning and surface search sets, as well as fire control radars, guiding their main gun and secondary batteries and their AA guns. By war's end, the number of small AA guns had proliferated markedly. For example, by 1944 *Rodney* carried 68 20mm AA guns (ten of them in twin mountings), and Types 271 and 272 (surface-search), 279 (air-warning), 282, 283, 284 and 285 (fire-control) and Type 650 (missile-jamming) radars. It is also worth pointing out that by 1944 both of these battleships had completely worn-out engines, but the decision was made not to replace them during the war. It is a fair assumption, then, that if the G3 and N3 classes had been built, they would have been upgraded in the same way.

The United States Navy

The closest we can get to predicting the career evolution of the South Dakota and Lexington classes is to look at how the previous Tennessee and Colorado classes fared during the interwar period. These entered service in 1920–23, with a fourth half-built Colorado-class battleship, USS *Washington*, cancelled after the Washington Treaty. All had minor modifications made during the 1920s, mainly involving the provision of catapult-launched aircraft and facilities for them, and the addition of 5in AA guns and 0.5in AA machine guns.

In December 1941, *West Virginia* was sunk at Pearl Harbor, but was refloated the following May and then rebuilt, with new torpedo bulges, thicker deck armour and a greatly increased light AA armament. *Tennessee* and *California* were also damaged at Pearl Harbor. In late 1942, it was decided to remodel her superstructure in the style of the cancelled South Dakota class. *California*, although more seriously damaged, was largely rebuilt along her original lines. Both ships were also provided with a greatly increased AA armament. All five battleships also received air and surface search (SC) and fire control (FC) radar during the war, and like the British ships their light AA provision was increased dramatically during 1944–45. All retained their value through careers spanning over three decades.

Battleship	Partial modernization	Rebuilding	Fate
BB-43 *Tennessee*	1929–30	1942–43	Scrapped 1959
B-44 *California*	1929–30	1942–44	

Battleship	Partial modernization	Rebuilding	Fate
BB-45 *Colorado*	1922	1941–42	Scrapped 1959
B-46 *Maryland*	1922	1942–43	
BB-48 *West Virginia*	1922	1942–44	

The Imperial Japanese Navy

To understand the IJN super-battleships, we need to look at how the Kongo and Nagato classes fared during the interwar period. Modifications made in the 1920s were minimal for the two Nagatos. The Kongos underwent a more extensive modernization, to increase their armour protection. Their propulsion systems were also modernized, and provision made for the carrying of aircraft. They were modernized again in the late 1930s, with new propulsion systems replacing old ones, length increased to improve performance, deck armour thickened and AA armament increased.

The Nagatos underwent a major rebuild in the early 1930s, where torpedo bulges were added, deck armour thickened again, the hull lengthened and the funnels trunked. In both classes of battleships, the bridge structures were extensively modified, to incorporate the new 'pagoda' design favoured by Japanese naval designers. In all cases, experience gained during the opening years of the war saw additions to light AA provision, and in 1944, for the ships left in service, the employment of radar.

Battleship	Partial modernization	Rebuilding	Fate
Nagato	1924	1933–34	Sunk as target 1946
Mutsu	1924	1934–35	Sunk June 1943

Battlecruiser	Partial modernization	Rebuilding	Fate
Kongo	1929–31	1936–37	Sunk November 1944
Hiei	1929–32	1937–40	Sunk November 1942
Kirishima	1927–30	1935–36	Sunk November 1942
Haruna	1927–29	1933–34	Scrapped 1946

In all three navies, the tenor of these modifications was similar. Partial modernization in the 1920s incorporated lessons learned from World War I. This centred around increasing armour in battlecruisers, improvements in underwater protection and the addition of catapult-launched aircraft. In the case of super-battleships, it is likely that these modifications would have been incorporated into their construction. However, by the 1930s it was likely these ships' propulsion systems would be upgraded, and the ships might undergo structural changes, to improve visibility and crew facilities.

By the mid-1930s, it was clear that aircraft would be more of a threat to capital ships than had been envisaged a decade before. So, the super-battleships would have undergone improvements in their AA provision, with the upgrading of heavy AA guns, usually by grouping them into more efficient twin mounts, and the addition of light AA guns. Furthermore, they would have received any improved fire control systems available, including the equivalent of the British HACS. Gun elevations would have been increased too, to take advantage of improved shell charges, which offered the ability to fire over greater ranges.

Then, when World War II came, these super-battleships would have incorporated the wartime improvements granted to other capital ships. Primarily, these would have included radar of various kinds (surface search, air warning and fire control), and a great proliferation of light AA weapons. It was radar, though, that would have made the greatest difference. With radar fire control, the effectiveness of these super-battleships would have increased markedly, particularly when operating at night, or in poor visibility. If these upgraded and modernized super-battleships survived the war, then they would have exceeded the three-generation requirement of their builders.

Those still in service in the early Cold War era might have been modified again, to provide a useful missile as well as a gun platform. Instead, these super-battleships never had the chance to shine. Their existence was swept away by the stroke of a pen on the conference table in Washington.

FURTHER READING

Brown, David K., *The Grand Fleet: Warship Design and Development, 1906–1922*, Seaforth Publishing, Barnsley (1997)

Brown, David K., *Nelson to Vanguard: Warship Design and Development, 1923–1945*, Naval Institute Press, Annapolis, MD (2015)

Burt, R.A, *British Battleships of World War One*, Seaforth Publishing, Barnsley (2012)

Friedman, Norman, *Battleship Design and Development, 1905–1945*, Smithmark Publishing, New York, NY (1979)

Friedman, Norman, *Fighting the Great War at Sea: Strategy, Tactics and Technology*, Seaforth Publishing, Barnsley (2014)

Friedman, Norman, *US Battleships: An Illustrated Design History*, Naval Institute Press, Annapolis, MD (2021)

Gardiner, Robert (ed.), *Conway's All the World's Fighting Ships, 1922–46*, Conway Maritime Press, London (1980)

Gardiner, Robert (ed.), *Conway's All the World's Fighting Ships, 1906–1921*, Conway Maritime Press, London (1985)

Gardiner, Robert, *The Eclipse of the Big Gun: The Warship 1906–45*, Conway Maritime Press History of the Ship Series, London (1992)

Goldstein, Erik & Mauer, John (eds.); *The Washington Conference, 1921–22: Naval Rivalry, East Asian Stability & The Road to Pearl Harbor*, Routledge Ltd., Oxford (1994)

Hodges, Peter, *The Big Gun: Battleship Main Armament, 1860–1945*, Conway Maritime Press, London (1981)

Jentschura, Hansgeorg & Jung, Dieter; *Warships of the Imperial Japanese Navy, 1869–1945*, Arms & Armour, London (1977)

Jordan, John, *Warships after Washington: The Development of the Five Major Fleets, 1922–1930*, Seaforth Publishing, Barnsley (2011)

Low, Joseph E., *The Kongō Class Battleship of the Imperial Japanese Navy*, six volumes, Self-Published (2022)

Martindale, E.V., *Battleships of World War I and World War II, 1914–45: A Technical Guide*, Amber Books, London (2023)

Moore, John (contributor), *Jane's Fighting Ships of World War I*, Studio Editions (1990)

Parkes, Oscar, *British Battleships, 1860–1950*, Seeley, Service & Co., Sons, London (1973)

Pears, Randolph, *British Battleships, 1892–1957: The Great Days of the Fleets*, Randolph Pears, London (1957)

Ross, David, Battleships: *The World's Greatest Battleships from the 16th Century to the Gulf War*, Amber Books, London (2022)

Skwiot, Miroslaw, *Japanese Battleships, 1905–1942*, Kagero Publishing, Wólka, Lublin (2017)

Stern, Robert, *The Battleship Holiday: The Naval Treaties and Capital Ship Design*, Seaforth Publishing, Barnsley (2017)

Terzibaschitsch, Stefan (ed.), *Battleships of the US Navy in World War II*, Brasseys, London (1977)

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Title page caption: A conceptual depiction of a South Dakota-class super-battleship by Rose Stokes in 1922, based on the plans approved by the navy two years earlier. This stylish view of the warship emphasizes the elegant clipper bow of these warships, which would have given these ships a sleek, modern appearance.